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TROPICAL AMERICAN PLANTS.

ADVERTISEMENT.

The United States National Herbarium, which was founded by the Smithsonian Institution, was transferred in the year 1868 to the Department of Agriculture, and continued to be maintained by that department until July 1, 1896, when it was returned to the official custody of the Smithsonian Institution. The Department of Agriculture, however, continued to publish the series of botanical reports entitled "Contributions from the United States National Herbarium," which it had begun in the year 1890, until, on July 1, 1902, the National Museum, in pursuance of an act of Congress, assumed responsibility for the publication. The first seven volumes of the series were issued by the Department of Agriculture.

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Assistant Secretary, Smithsonian Institution,
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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 18

SYSTEMATIC INVESTIGATIONS OF TROPICAL AMERICAN PLANTS

PITTIER, HITCHCOCK and CHASE
SAFFORD, STANDLEY



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PREFACE.

Of the seven parts composing volume 18 of the Contributions, the first is by Mr. W. E. Safford, of the Bureau of Plant Industry, United States Department of Agriculture. It represents an extension of his work on the family Annonaceae. In various preliminary papers Mr. Safford has proposed several new sections of the genus *Annona* and has described many of the tropical American species. The present treatment is more comprehensive, embracing a synoptical view of the genus by natural groups and sections, with descriptions of additional new or inadequately known species. There are given, also, descriptions of two closely allied new genera, *Fusaea* and *Geanthemum*, and critical notes upon *Rollinia*, *Duguetia*, and *Raimondia*. This last genus, recently founded upon a single species, is found properly to include also a Colombian plant, described long ago by Humboldt, Bonpland, and Kunth as *Annona quinduensis*.

The second paper, by Mr. Henry Pittier, also of the Bureau of Plant Industry, United States Department of Agriculture, is in continuation of a series begun by him several years ago in the Contributions, dealing principally with Colombian and Central American plants which are of economic value. Besides descriptions of two new species of *Brosimum* and *Spondias* there are included further notes upon the difficult genus *Sapium* and a discussion of the nomenclature of the sapote and sapodilla, two important tropical American fruit trees whose taxonomic history is exceedingly involved.

The third part consists of a second installment of studies by Mr. Paul C. Standley, of the United States National Herbarium, upon the flowering plants of tropical America. The new species described and the changes of nomenclature proposed are largely the result of work upon certain groups, chiefly Rubiaceae, Malvaceae, and Leguminosae, as represented in the extensive collections obtained recently in Panama during the progress of the Smithsonian Biological Survey of the Panama Canal Zone. A large part of the paper consists of descriptions and nomenclatorial changes in the Amaranthaceae and Allioniaceae incidental to monographic work upon these families. Two new genera are proposed in the Malvaceae.

Part 4 is the fifth paper of Mr. Pittier's series mentioned above. In this part are discussed various trees and shrubs of Central America

and the northern part of South America, hitherto imperfectly or not at all known. Most of them are components of the wonderfully rich native Isthmian silva and several are of importance as timber trees. A large part of the paper is devoted to a revision of the genera *Brownea* and *Browneopsis* founded on the extensive material collected by the author in Darien and Venezuela. Mr. Pittier's recent observations and collections in Panama permit a better understanding of the genera *Bombax* and *Pachira*, which has led him to segregate two species from *Pachira* to form the new genus *Bombacopsis*.

Part 5 consists of a paper by Mr. Pittier dealing with *Inga*, a very large American genus of leguminous trees. In identifying recent Panama material Mr. Pittier found it necessary to undertake a critical review of all the species of the genus. No general treatment of *Inga* has appeared since Bentham's extensive monograph in 1875, although many species have been described since that year. For several reasons a conclusive revision of the genus is impracticable at the present time. Many of Mr. Pittier's conclusions, however, are embodied in this paper, which consists chiefly of critical observations upon the characters and status of some of the older species, notes on their arrangement in a natural classification, and descriptions of new species as represented by specimens in several of the larger American herbaria. There is given, in conclusion, a list of all the species deemed valid, with an indication of those lacking in the American herbaria consulted.

In part 6, which is the sixth installment of his series on Central American and Colombian plants, Mr. Pittier puts on record further results of his work. All the species treated are trees or shrubs, and most of them are here described for the first time. One of the new species, *Mimusops darienensis*, is the tree which yields the Panama "balata" or gutta-percha, a very important commercial product. Hitherto this tree has been confused with another species of *Mimusops*, from British Guiana.

The last and longest paper (part 7), by A. S. Hitchcock, Systematic Agrostologist of the United States Department of Agriculture, and Agnes Chase, Assistant Agrostologist, brings together in a single convenient publication our knowledge of the grass flora of the West Indian Islands. Though some of the earliest collections of plants sent from America to Europe came from the West Indies, and though the flora of this region has since been studied by many botanists, no account of the grasses of the whole region has hitherto been published. The present paper is based upon large collections from practically all the islands of the group and upon field studies by both authors. It includes 110 genera and 455 species, of which 1 genus and 17 species

are new. The new genus, *Saugetia*, is named in honor of Brother León, Joseph Sylvestre Sauget, of the Colegio de La Salle, Habana, one of the most active of Cuban botanists. The brief descriptions, giving the salient characteristics of the species and genera, are intended to supplement the keys and confirm identifications. To facilitate the use of the work as a manual the detailed citation of specimens under each species is omitted. Appended to the paper, however, is a list of all the numbered specimens of West Indian grasses in the United States National Herbarium.

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CONTENTS.

	Page.
CLASSIFICATION OF THE GENUS ANNONA WITH DESCRIPTIONS OF NEW AND IMPERFECTLY KNOWN SPECIES. By W. E. Safford.....	1
Division of the genus into natural groups.....	1
Introductory notes.....	1
Characters of the genus.....	1
Geographical distribution.....	4
Species incorrectly referred to Annona.....	5
Scheme of the proposed subdivisions.....	6
Key to the groups.....	6
Characters of the groups and sections.....	6
Group Guanabani (soursops).....	6
Section Euannona.....	7
Section Psammogenia.....	8
Section Ulocarpus.....	9
Group Pilaeflorae (silky Annonas).....	10
Section Helogenia.....	11
Section Pilannona.....	12
Section Gamopetalum.....	13
Group Acutiflorae (sharp-petaled Annonas).....	14
Section Phelloxylon.....	14
Section Atractanthus.....	15
Group Attæ (custard apples).....	16
Section Chelonocarpus.....	18
Section Atta.....	18
Section Ilama.....	19
Section Saxigena.....	20
Group Annonellæ (dwarf Annonas).....	21
Section Annonula.....	21
Section Annonella.....	21
New and imperfectly known species of Annona.....	22
Plants originally described under Annona but generically distinct.....	58
Rollinia, Duguetia, and Raimondia, genera already established.....	58
Fusaea and Geanthemum, new genera.....	64
NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA—4.	
By Henry Pittier.....	69
Introduction.....	69
Moraceæ.....	69
A new species of Brosimum from Costa Rica.....	69
Euphorbiaceæ.....	70
Further notes on species of Sapium.....	70
Anacardiaceæ.....	75
A new species of Spondias from Costa Rica.....	75
Sapotaceæ.....	76
Zapotes and Zapotillos.....	76

STUDIES OF TROPICAL AMERICAN PHANEROGAMS—No. 2. By Paul C. Standley.	Page.
Introduction.....	87
New Cyperaceae from Panama.....	87
New Amaranthaceae from tropical North America.....	88
New or notable Allioniaceae.....	98
New Caesalpinaceae from Panama.....	102
New or notable Mimosaceae from Panama.....	104
New Panamanian Fabaceae.....	106
New or notable species of Geranium from Colombia and Venezuela.....	110
Wercklea, a new genus of Malvaceae.....	111
Peltaea, a new genus of Malvaceae.....	113
The genus Lopimia.....	114
Four new species of Malache from Panama and Costa Rica.....	115
A new Waltheria from Colombia.....	117
New or notable Ebenaceae from Mexico.....	118
A new Styrax from Panama.....	121
Tardavel a valid generic name to replace Borreria.....	122
Restoration of the generic name Evea, with descriptions of two new species.....	123
Duggena an older name than Gonzalagunia.....	124
New or notable species of Arcytophyllum.....	126
New species of Psychotria from Panama.....	128
New species of Rubiaceae of several genera, chiefly from Panama.....	133
NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA—5.	
By Henry Pittier.....	143
Introduction.....	143
Myristicaceae.....	143
A new species of Virola and an old one of Compsonura.....	143
Caesalpinaceae.....	145
The genera Brownea and Browneopsis as represented in Panama, Colombia, and Venezuela.....	145
Need of new treatment.....	145
Brownea versus Hermesias.....	145
The species of Brownea.....	146
Geographical distribution of the species.....	147
The genus Browneopsis.....	148
Affinities of Brownea and Browneopsis.....	148
Panamanian and Venezuelan species of Brownea.....	149
A new species of Browneopsis.....	157
Anacardiaceae.....	157
An old and a new species of Tapirira.....	157
Hippocrateaceae.....	159
A new species of Salacia.....	159
Bombacaceae.....	159
Bombacopsis, a new Central American genus between Bombax and Pachira.....	159
Characters of Bombax.....	159
Characters of Pachira.....	160
The differences sufficient for distinction.....	160
An intermediate genus required.....	161
Key to Bombax, Pachira, and Bombacopsis.....	161
Description of Bombacopsis and its species.....	162
Flacourtiaceae.....	163
A new species of Zuelania and an old one of Oncoba.....	163

NEW OR NOTEWORTHY PLANTS FROM COLOMBIA, ETC.—Continued.	Page.
Sapotaceae.....	165
Species, mostly new, of <i>Chrysophyllum</i> , <i>Lucuma</i> , and <i>Bumelia</i>	165
Symplocaceae.....	168
A new species of <i>Symplocos</i>	168
Verbenaceae.....	169
New species of <i>Citharexylum</i> and <i>Vitex</i> and an old one of <i>Vitex</i>	169
PRELIMINARY REVISION OF THE GENUS INGA. By Henry Pittier.....	173
Introduction.....	173
Systematic treatment.....	174
Section 1. <i>Leptinga</i>	174
New species.....	174
Notes on critical species.....	177
Section 2. <i>Diadema</i>	178
New species.....	178
Two species published as one.....	179
Species transferred to or from <i>Diadema</i>	181
Section 3. <i>Bourgonia</i>	181
Critical notes on several species.....	181
Section 4. <i>Pseudinga</i>	182
Series 1. <i>Glabriflorae</i>	182
Series 2. <i>Gymnopodae</i>	183
New species.....	183
Notes on critical species.....	187
Series 3. <i>Pilosiusculae</i>	188
New species.....	188
Critical notes.....	193
Series 4. <i>Leptanthae</i>	195
Notes.....	195
Series 5. <i>Longiflorae</i>	195
Critical notes.....	195
Series 6. <i>Calocephalae</i>	198
New species.....	198
Descriptions of two old species with notes.....	199
Series 7. <i>Vulpinae</i>	201
New species.....	201
Series 8. <i>Dysanthae</i>	204
A new species.....	204
Section 5. <i>Euinga</i>	205
Series 1. <i>Tetragonae</i>	205
Descriptions of old and new species.....	205
Series 2. <i>Sulcatae</i>	210
Descriptions of new and old species.....	210
Notes on old species with descriptions of new subspecies.....	216
Group of <i>Inga vera</i>	216
Group of <i>Inga edulis</i>	217
Group of <i>Inga spuria</i>	217
List of the known species of <i>Inga</i>	218
NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA—6.	
By Henry Pittier.....	225
Introduction.....	225
Moraceae.....	225
Two new species of <i>Coussapoa</i>	225
Four new species of <i>Cecropia</i>	226

NEW OR NOTEWORTHY PLANTS FROM COLOMBIA, ETC.—Continued.		Page.
Proteaceae.....		228
Three new species of Roupala.....		228
An imperfectly known species of Embothrium.....		230
Caesalpiniaceae.....		231
Two new species of Schizolobium.....		231
A little known species of Macrolobium.....		233
Fabaceae.....		234
New or imperfectly known species of several genera.....		234
Vochysiaceae.....		237
A species of Vochysia redescribed.....		237
Ochnaceae.....		238
A species of Cespidesia redescribed.....		238
Combretaceae.....		238
Two new species of Terminalia.....		238
The Mexican and Central American species of Combretum, section Micropetalae.....		239
Four new or imperfectly known species of Combretum of other sections.		246
Melastomataceae.....		248
An old and a new species of Miconia.....		248
Sapotaceae.....		249
A new species of Mimusops.....		249
Boraginaceae.....		251
Seven new species of Cordia.....		251
Verbenaceae.....		254
A substitute for a preoccupied name.....		254
Bignoniaceae.....		254
Four new species of Adenocalymna.....		254
New species of several genera.....		257
GRASSES OF THE WEST INDIES. By A. S. Hitchcock and Agnes Chase.....		261
Introduction.....		261
Descriptive list, with keys.....		264
Doubtful species.....		401
List of new genera and species and new names.....		403
Catalogue of specimens in the United States National Herbarium, ar- ranged by collectors' names and numbers.....		405
INDEX.....		473

ILLUSTRATIONS.

PLATES.

	Facing page.
PLATE 1. <i>Annona muricata</i> L.....	68
2. A, B. Reproductive organs of <i>Annona purpurea</i> Moc. & Sessé.....	68
3. A. Gynœcium of <i>Annona muricata</i> L. B. Gynœcium of <i>Annona montana</i> Macfad.....	68
4. <i>Annona glabra</i> L., the alligator apple.....	68
5. A, B. Fruit of <i>Annona diversifolia</i> Safford.....	68
6. Flowers of <i>Annona montana</i> Macfad., from Porto Rico.....	68
7. Solitary fruit and leaves of <i>Annona montana</i> Macfad.....	68
8. A. Geminate fruit of <i>Annona montana</i> Macfad., from Porto Rico; B. Fruit of <i>Annona sphaerocarpa</i> Splitg., from Paramaribo, Surinam..	68
9. Young fruit and flower of <i>Annona marcgravii</i> Mart.....	68
10. Fruit of <i>Annona marcgravii</i> Mart., from Venezuela.....	68
11. Type specimen of <i>Annona salzmanni</i> A. DC.....	68
12. Young flowers and leaves of <i>Annona purpurea</i> Moc. & Sessé, from Costa Rica.....	68
13. <i>Annona purpurea</i> Moc. & Sessé, with mature flower, from Venezuela.	68
14. Fruit of <i>Annona purpurea</i> Moc. & Sessé, from Panama.....	68
15. <i>Annona involucrata</i> Baill.....	68
16. Branch of <i>Annona involucrata</i> Baill., showing floral involucre.....	68
17. <i>Annona paludosa</i> Aubl.....	68
18. A. <i>Annona cornifolia</i> St. Hil.; B. <i>Annona paludosa</i> Aubl.....	68
19. <i>Annona jahnii</i> Safford.....	68
20. <i>Annona cornifolia</i> St. Hil., with solitary flower.....	68
21. <i>Annona nutans</i> R. E. Fries.....	68
22. <i>Annona acutiflora</i> Mart.....	68
23. <i>Annona lutescens</i> Safford.....	68
24. <i>Annona palmeri</i> Safford.....	68
25. <i>Annona longiflora</i> S. Wats.....	68
26. <i>Annona macroprophyllata</i> Donn. Smith.....	68
27. <i>Annona bullata</i> A. Rich.....	68
28. <i>Annona bullata</i> A. Rich., with fruit.....	68
29. <i>Annona crassivenia</i> Safford.....	68
30. <i>Annona crassivenia</i> Safford, with fruit.....	68
31. <i>Annona cascarilloides</i> Wright.....	68
32. <i>Annona sclerophylla</i> Safford.....	68
33. <i>Annona globiflora</i> Schlecht.....	68
34. <i>Annona bicolor</i> Urban.....	68
35. <i>Annona rosei</i> Safford.....	68
36. Flowers of <i>Annona rosei</i> Safford, enlarged.....	68
37. <i>Annona rosei</i> Safford.....	68
38. <i>Rollinia longifolia</i> St. Hil.....	68
39. <i>Rollinia mucosa</i> (Jacq.) Baill.....	68
40. <i>Raimondia quinduensis</i> (H. B. K.) Safford.....	68

	Facing page.
PLATE 41. <i>Geanthemum rhizanthum</i> (Eichl.) Safford.....	68
42. <i>Sapium verum</i> Hemsl.....	70
43. <i>Sapium verum</i> Hemsl.....	71
44. A. Seeds of <i>Sapium hippomane</i> Meyer. B. Seeds of <i>Sapium verum</i> Hemsl. C. Seeds of <i>Sapium tolimense</i> Jumelle.....	72
45. <i>Sapium hippomane</i> Meyer.....	73
46. <i>Achras zapota</i> L.....	78
47. Seeds of <i>Achras zapota</i> L.....	79
48. <i>Calocarpum mammosum</i> Pierre.....	81
49. A. Seeds of <i>Calocarpum mammosum</i> (L.) Pierre. B. <i>Calocarpum</i> <i>mammosum</i> (L.) Pierre.....	81
50. Fruit of <i>Calocarpum mammosum</i> (L.) Pierre.....	82
51. Fruit of <i>Calocarpum mammosum</i> (L.) Pierre.....	82
52. <i>Calocarpum viride</i> Pittier.....	84
53. Fruit and seeds of <i>Calocarpum viride</i> Pittier.....	84
54. A. Seeds of <i>Calocarpum viride</i> Pittier. B. <i>Calocarpum viride</i> Pittier.....	85
55. Fruits of <i>Lucuma salicifolia</i> H. B. K.....	86
56. Seeds of <i>Lucuma salicifolia</i> H. B. K.....	86
57. <i>Viola warburgii</i> Pittier.....	143
58. Fruit of <i>Compsonaura costaricensis</i> Warb.....	144
59. <i>Brownea ariza</i> Benth.....	151
60. <i>Brownea ariza</i> Benth.....	151
61. <i>Brownea ariza</i> Benth.....	151
62. Seeds of <i>Brownea ariza</i> Benth.....	151
63. Pod and seeds of <i>Browneopsis excelsa</i> Pittier.....	157
64. <i>Bombax barrigon</i> (Seem.) Decaisne.....	160
65. <i>Bombax barrigon</i> (Seem.) Decaisne.....	160
66. <i>Bombax barrigon</i> (Seem.) Decaisne.....	160
67. <i>Bombax barrigon</i> (Seem.) Decaisne.....	160
68. <i>Pachira macrocarpa</i> Walp.....	160
69. Seeds of <i>Pachira macrocarpa</i> Walp.....	160
70. <i>Pachira aquatica</i> Aubl.....	160
71. Fruit of <i>Pachira aquatica</i> Aubl.....	160
72. Flower of <i>Pachira insignis</i> Sav.....	160
73. Fruit of <i>Pachira insignis</i> Sav.....	160
74. <i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
75. <i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
76. <i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
77. <i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
78. <i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
79. <i>Zuelania roussoviae</i> Pittier.....	164
80. Fruit of <i>Lucuma sclerocarpa</i> Pittier.....	166
81. <i>Inga mazoniana</i> Pittier.....	174
82. Fruit of <i>Inga roussoviana</i> Pittier.....	176
83. <i>Inga portobellensis</i> Beurling.....	178
84. Fruit of <i>Inga portobellensis</i> Beurling.....	178
85. <i>Inga myriantha</i> Poepp. & Endl.....	178
86. <i>Inga sertulifera</i> DC.....	178
87. <i>Inga umbellifera</i> Steud.....	178
88. Fruit of <i>Inga paterno</i> Harms.....	180
89. Fruit of <i>Inga aestuariorum</i> Pittier.....	184
90. <i>Inga pinetorum</i> Pittier.....	184

	Facing page.
PLATE 91. <i>Inga popayanensis</i> Pittier.....	186
92. <i>Inga semiglabra</i> Pittier.....	186
93. <i>Inga leptoloba</i> Schlecht.....	188
94. Fruit of <i>Inga leptoloba</i> Schlecht.....	188
95. Fruit of <i>Inga ruiziana</i> Don.....	188
96. Fruit of <i>Inga monticola</i> Pittier.....	190
97. <i>Inga densiflora</i> Benth.....	190
98. <i>Inga stenopoda</i> Pittier.....	192
99. <i>Inga micheliana</i> Harms.....	194
100. <i>Inga maritima</i> Benth.....	194
101. <i>Inga lomatophylla</i> (Benth.) Pittier.....	194
102. <i>Inga codonantha</i> Pittier.....	202
103. <i>Inga pauciflora</i> Walp. & Duchass.....	214
104. <i>Inga vera portoricensis</i> Pittier.....	216
105. Fruits of <i>Inga ingoides</i> (A. Rich.) Willd.....	216
106. Fruit of <i>Clytostoma isthmicum</i> Pittier.....	260

TEXT FIGURES.

	Page.
FIGURE 1. Flower of <i>Annona squamosa</i>	2
2. Flower of <i>Annona acuminata</i>	2
3. Essential parts of the flower of <i>Annona muricata</i>	3
4. Carpel of <i>Annona jenmanii</i>	3
5. Leaf of <i>Annona montana</i> , showing axillary pockets.....	7
6. <i>Annona montana</i>	7
7. <i>Annona pygmaea</i>	8
8. <i>Annona salzmanni</i>	9
9. Flower of <i>Annona purpurea</i>	9
10. Carpels of <i>Annona montana</i> and of <i>A. purpurea</i>	9
11. <i>Annona involucrata</i> , showing involucre of inflorescence..	10
12. Leaf and flower of <i>Annona rodriguesii</i>	10
13. Fruit of <i>Annona rodriguesii</i>	11
14. Flower of <i>Annona paludosa</i>	12
15. Flower and essential parts of <i>Annona sericea</i>	12
16. Flower of <i>Annona holosericea</i>	13
17. <i>Annona nutans</i> and <i>A. cornifolia</i>	13
18. Flower of <i>Annona glabra</i> , from Miami, Florida.....	14
19. Flower of <i>Annona glabra</i> , showing valvate inner petals.....	15
20. Gynœcium of <i>Annona glabra</i> , showing consolidated ovaries.....	15
21. <i>Annona acutiflora</i>	16
22. <i>Annona scleroderma</i>	17
23. Stamens and carpel of <i>Annona scleroderma</i>	18
24. Flower of <i>Annona pittieri</i>	18
25. <i>Annona reticulata</i> , the common custard apple.....	18
26. Flower of <i>Annona cherimola</i>	19
27. <i>Annona diversifolia</i>	19
28. Flower of <i>Annona diversifolia</i>	20
29. Seed of <i>Annona diversifolia</i> and one of <i>A. cherimola</i>	20
30. Leaves of <i>Annona bullata</i>	20
31. Leaves of <i>Annona crassivenia</i>	20
32. Fruit of <i>Annona bullata</i>	21
33. Leaves of <i>Annona sclerophylla</i>	21
34. <i>Annona globiflora</i>	23
35. Fruit of <i>Annona globiflora</i>	23

	Page.
FIGURE 36. Leaves and flower of <i>Annona sphaerocarpa</i>	25
37. Leaves and flower of <i>Annona coriacea</i>	29
38. Stamens of <i>Annona salzmanni</i>	29
39. Ovaries of <i>Annona salzmanni</i>	29
40. Seed of <i>Annona purpurea</i> and one of <i>A. muricata</i>	31
41. <i>Annona paludosa</i>	34
42. Stamens of <i>Annona paludosa</i>	35
43. Carpels of <i>Annona paludosa</i>	35
44. Base of leaf of <i>Annona jahnii</i>	36
45. Stamens and carpel of <i>Annona jahnii</i>	36
46. Geminate peduncles and other details of <i>Annona cornifolia</i>	38
47. Flower of <i>Annona acutiflora</i>	40
48. Immature fruit and stamens of <i>Annona acutiflora</i>	41
49. Inflorescence and leaves of <i>Annona lutescens</i>	42
50. Inner petals of <i>Annona lutescens</i>	42
51. Floral details of <i>Annona lutescens</i> and <i>A. glabra</i>	42
52. Leaf of <i>Annona lutescens</i> and one of <i>A. reticulata</i>	43
53. <i>Annona palmeri</i>	44
54. Flower of <i>Annona palmeri</i>	45
55. <i>Annona longiflora</i>	46
56. Flower of <i>Annona longiflora</i>	47
57. Flower of <i>Annona bullata</i>	48
58. Essential parts of flower of <i>Annona bullata</i>	49
59. Stamens of <i>Annona crassivenia</i>	50
60. Flower of <i>Annona cascarilloides</i>	51
61. Leaf of <i>Annona cascarilloides</i>	52
62. Flower of <i>Annona sclerophylla</i>	53
63. Flower of <i>Annona globiflora</i>	54
64. Flower of <i>Annona bicolor</i>	55
65. Stamen and carpel of <i>Annona bicolor</i>	55
66. Essential parts of flower of <i>Annona rosei</i>	57
67. Stamens and carpel of <i>Rollinia mucosa</i>	59
68. Fruit of <i>Duguetia lanceolata</i>	60
69. Flower of <i>Duguetia furfuracea</i>	61
70. Flower of <i>Duguetia furfuracea</i> , with essential parts.....	61
71. <i>Aberemoa guianensis</i>	62
72. <i>Raimondia quinduensis</i>	63
73. Flower of <i>Fusaea longifolia</i>	65
74. Concrete fruit of <i>Fusaea longifolia</i>	65
75. <i>Uvaria sessilis</i>	66
76. Flowers of <i>Brosimum terrabanum</i>	69
77. Male flower of <i>Sapium tolimense</i>	72
78. Female flower of <i>Sapium tolimense</i>	72
79. Tip of leaf of <i>Sapium hippomane</i>	73
80. Male flower of <i>Sapium hippomane</i>	73
81. Female flower of <i>Sapium hippomane</i>	74
82. Floral details of <i>Spondias nigrescens</i>	76
83. Floral details of <i>Calocarpum mammosum</i>	82
84. Spread corolla of <i>Calocarpum mammosum</i> with stamens and stamino- nodes.....	82
85. Part of corolla of <i>Calocarpum viride</i> with stamens and staminodes..	84
86. Floral details of <i>Calocarpum viride</i>	85
87. Floral details of <i>Lucuma salicifolia</i>	86

	Page.
FIGURE 88. <i>Salacia blepharodes</i>	159
89. <i>Oncoba laurina</i>	164
90. <i>Chrysophyllum panamense</i>	165
91. <i>Lucuma sclerocarpa</i>	166
92. <i>Lucuma standleyana</i>	167
93. <i>Bumelia obovata</i>	168
94. <i>Symplocos chiriquensis</i>	168
95. <i>Symplocos chiriquensis</i>	168
96. <i>Vitex masoniana</i>	170
97. <i>Vitex floridula</i>	171
98. Perianth of <i>Combretum farinosum</i>	242
99. Perianth of <i>Combretum polystachyum</i> ,	244
100. Perianth of <i>Combretum benthamianum</i>	246
101. Floral detail of <i>Cordia eriostigma</i>	251
102. Flower and pistil of <i>Cordia trichostyla</i>	252
103. Flower and detail of <i>Cordia acuta</i>	253
104. Flower and pistil of <i>Cordia littoralis</i>	253

SMITHSONIAN INSTITUTION
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CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 18, PART 1

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WITH DESCRIPTIONS OF NEW AND
IMPERFECTLY KNOWN SPECIES

By W. E. SAFFORD



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II

PREFACE.

In various preliminary papers, to which reference is made in the accompanying text, Mr. W. E. Safford, of the Bureau of Plant Industry, United States Department of Agriculture, has proposed several new sections of the genus *Annona* and has described many of the tropical American species. The present treatment is more comprehensive, embracing a synoptical view of the genus by natural groups and sections, with descriptions of additional new or inadequately known species. There are given, also, descriptions of two closely allied new genera, *Fusaea* and *Geanthemum*, and critical notes upon *Rollinia*, *Duguetia*, and *Raimondia*. This last genus, recently founded upon a single species, is found properly to include also a Colombian plant, described long ago by Humboldt, Bonpland, and Kunth as *Anona quinduensis*.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

CONTENTS.

	Page.
Division of the genus into natural groups.....	1
Introductory notes.....	1
Characters of the genus.....	1
Geographical distribution.....	4
Species incorrectly referred to <i>Annona</i>	5
Scheme of the proposed subdivisions.....	6
Key to the groups.....	6
Characters of the groups and sections.....	6
Group Guanabani (soursops).....	6
Section <i>Euannona</i>	7
Section <i>Psammogenia</i>	8
Section <i>Ulocarpus</i>	9
Group <i>Pilaeflorae</i> (silky <i>Annonas</i>).....	10
Section <i>Helogenia</i>	11
Section <i>Pilannona</i>	12
Section <i>Gamopetalum</i>	13
Group <i>Acutiflorae</i> (sharp-petaled <i>Annonas</i>).....	14
Section <i>Phelloxylon</i>	14
Section <i>Atractanthus</i>	15
Group <i>Attæ</i> (custard apples).....	16
Section <i>Chelonocarpus</i>	18
Section <i>Atta</i>	18
Section <i>Ilama</i>	19
Section <i>Saxigena</i>	20
Group <i>Annonellæ</i> (dwarf <i>Annonas</i>).....	21
Section <i>Annonula</i>	21
Section <i>Annonella</i>	21
New and imperfectly known species of <i>Annona</i>	22
Plants originally described under <i>Annona</i> but generically distinct.....	58
<i>Rollinia</i> , <i>Duguetia</i> , and <i>Raimondia</i> , genera already established.....	58
<i>Fusæa</i> and <i>Geanthemum</i> , new genera.....	64
Index.....	xi

ILLUSTRATIONS.

PLATES.

		Facing page.
PLATE 1.	<i>Annona muricata</i> L.....	68
2.	A, B, Reproductive organs of <i>Annona purpurea</i> Moc. & Sessé.....	68
3.	A. Gynœcium of <i>Annona muricata</i> L. B. Gynœcium of <i>Annona montana</i> Macfad.....	68
4.	<i>Annona glabra</i> L., the alligator apple.....	68
5.	A, B, Fruit of <i>Annona diversifolia</i> Safford.....	68
6.	Flowers of <i>Annona montana</i> Macfad., from Porto Rico.....	68
7.	Solitary fruit and leaves of <i>Annona montana</i> Macfad.....	68
8.	A. Geminate fruit of <i>Annona montana</i> Macfad., from Porto Rico; B. Fruit of <i>Annona sphaerocarpa</i> Splitg., from Paramaribo, Surinam..	68
9.	Young fruit and flower of <i>Annona marcgravii</i> Mart.....	68
10.	Fruit of <i>Annona marcgravii</i> Mart., from Venezuela.....	68
11.	Type specimen of <i>Annona salzmanni</i> A. DC.....	68
12.	Young flowers and leaves of <i>Annona purpurea</i> Moc. & Sessé, from Costa Rica.....	68
13.	<i>Annona purpurea</i> Moc. & Sessé, with mature flower, from Venezuela.	68
14.	Fruit of <i>Annona purpurea</i> Moc. & Sessé, from Panama.....	68
15.	<i>Annona involucrata</i> Baill.....	68
16.	Branch of <i>Annona involucrata</i> Baill., showing floral involucre.....	68
17.	<i>Annona paludosa</i> Aubl.....	68
18.	A. <i>Annona cornifolia</i> St. Hil.; B. <i>Annona paludosa</i> Aubl.....	68
19.	<i>Annona jahnii</i> Safford.....	68
20.	<i>Annona cornifolia</i> St. Hil., with solitary flower.....	68
21.	<i>Annona nutans</i> R. E. Fries.....	68
22.	<i>Annona acutiflora</i> Mart.....	68
23.	<i>Annona lutescens</i> Safford.....	68
24.	<i>Annona palmeri</i> Safford.....	68
25.	<i>Annona longiflora</i> S. Wats.....	68
26.	<i>Annona macrophyllata</i> Donn. Smith.....	68
27.	<i>Annona bullata</i> A. Rich.....	68
28.	<i>Annona bullata</i> A. Rich., with fruit.....	68
29.	<i>Annona crassivenia</i> Safford.....	68
30.	<i>Annona crassivenia</i> Safford, with fruit.....	68
31.	<i>Annona cascarilloides</i> Wright.....	68
32.	<i>Annona sclerophylla</i> Safford.....	68
33.	<i>Annona globiflora</i> Schlecht.....	68
34.	<i>Annona bicolor</i> Urban.....	68
35.	<i>Annona rosei</i> Safford.....	68
36.	Flowers of <i>Annona rosei</i> Safford, enlarged.....	68
37.	<i>Annona rosei</i> Safford.....	68
38.	<i>Rollinia longifolia</i> St. Hil.....	68
39.	<i>Rollinia mucosa</i> (Jacq.) Baill.....	68
40.	<i>Raimondia quinduensis</i> (H. B. K.) Safford.....	68
41.	<i>Geanthemum rhizanthum</i> (Eichl.) Safford.....	68

TEXT FIGURES.

	Page.
FIGURE 1. Flower of <i>Annona squamosa</i>	2
2. Flower of <i>Annona acuminata</i>	2
3. Essential parts of the flower of <i>Annona muricata</i>	3
4. Carpel of <i>Annona jenmanii</i>	3
5. Leaf of <i>Annona montana</i> , showing axillary pockets	7
6. <i>Annona montana</i>	7
7. <i>Annona pymaea</i>	8
8. <i>Annona salzmanni</i>	9
9. Flower of <i>Annona purpurea</i>	9
10. Carpels of <i>Annona montana</i> and of <i>A. purpurea</i>	9
11. <i>Annona involucrata</i> , showing involucre of inflorescence ..	10
12. Leaf and flower of <i>Annona rodriguesii</i> ,	10
13. Fruit of <i>Annona rodriguesii</i>	11
14. Flower of <i>Annona paludosa</i>	12
15. Flower and essential parts of <i>Annona sericea</i>	12
16. Flower of <i>Annona holosericea</i>	13
17. <i>Annona nutans</i> and <i>A. cornifolia</i>	13
18. Flower of <i>Annona glabra</i> , from Miami, Florida	14
19. Flower of <i>Annona glabra</i> , showing valvate inner petals	15
20. Gynœcium of <i>Annona glabra</i> , showing consolidated ovaries	15
21. <i>Annona acutiflora</i>	16
22. <i>Annona scleroderma</i>	17
23. Stamens and carpel of <i>Annona scleroderma</i>	18
24. Flower of <i>Annona pittieri</i>	18
25. <i>Annona reticulata</i> , the common custard apple	18
26. Flower of <i>Annona cherimola</i>	19
27. <i>Annona diversifolia</i>	19
28. Flower of <i>Annona diversifolia</i>	20
29. Seed of <i>Annona diversifolia</i> and one of <i>A. cherimola</i>	20
30. Leaves of <i>Annona bullata</i>	20
31. Leaves of <i>Annona crassivenia</i>	20
32. Fruit of <i>Annona bullata</i>	21
33. Leaves of <i>Annona sclerophylla</i>	21
34. <i>Annona globiflora</i>	23
35. Fruit of <i>Annona globiflora</i>	23
36. Leaves and flower of <i>Annona sphaerocarpa</i>	25
37. Leaves and flower of <i>Annona coriacea</i>	29
38. Stamens of <i>Annona salzmanni</i>	29
39. Ovaries of <i>Annona salzmanni</i>	29
40. Seed of <i>Annona purpurea</i> and one of <i>A. muricata</i>	31
41. <i>Annona paludosa</i>	34
42. Stamens of <i>Annona paludosa</i>	35
43. Carpels of <i>Annona paludosa</i>	35
44. Base of leaf of <i>Annona jahnii</i>	36
45. Stamens and carpel of <i>Annona jahnii</i>	36
46. Geminate peduncles and other details of <i>Annona cornifolia</i>	38
47. Flower of <i>Annona acutiflora</i>	40
48. Immature fruit and stamens of <i>Annona acutiflora</i>	41
49. Inflorescence and leaves of <i>Annona lutescens</i>	42
50. Inner petals of <i>Annona lutescens</i>	42
51. Floral details of <i>Annona lutescens</i> and <i>A. glabra</i>	42
52. Leaf of <i>Annona lutescens</i> and one of <i>A. reticulata</i>	43

TEXT FIGURES—continued.

	Page.
FIGURE 53. <i>Annona palmeri</i>	44
54. Flower of <i>Annona palmeri</i>	45
55. <i>Annona longiflora</i>	46
56. Flower of <i>Annona longiflora</i>	47
57. Flower of <i>Annona bullata</i>	48
58. Essential parts of flower of <i>Annona bullata</i>	49
59. Stamens of <i>Annona crassivenia</i>	50
60. Flower of <i>Annona cascarilloides</i>	51
61. Leaf of <i>Annona cascarilloides</i>	52
62. Flower of <i>Annona sclerophylla</i>	53
63. Flower of <i>Annona globiflora</i>	54
64. Flower of <i>Annona bicolor</i>	55
65. Stamen and carpel of <i>Annona bicolor</i>	55
66. Essential parts of flower of <i>Annona rosei</i>	57
67. Stamens and carpel of <i>Rollinia mucosa</i>	59
68. Fruit of <i>Duguetia lanceolata</i>	60
69. Flower of <i>Duguetia furfuracea</i>	61
70. Flower of <i>Duguetia furfuracea</i> , with essential parts	61
71. <i>Aberemoa guianensis</i>	62
72. <i>Raimondia quinduensis</i>	63
73. Flower of <i>Fusaea longifolia</i>	65
74. Concrete fruit of <i>Fusaea longifolia</i>	65
75. <i>Uvaria sessilis</i>	66

CLASSIFICATION OF THE GENUS ANNONA, WITH DESCRIPTIONS OF NEW AND IMPERFECTLY KNOWN SPECIES.

By W. E. SAFFORD.

DIVISION OF THE GENUS INTO NATURAL GROUPS.

INTRODUCTORY NOTES.

A critical study of the genus *Annona* has led the writer to place the American species in fourteen natural subdivisions or sections. These sections, arranged in four groups, are composed of closely allied species, in some cases showing their relationship by peculiarities of leaf structure, in others by the structure of the stamens and carpels or form of the flower, and in others by peculiarities of the fruit and seed. Some of the sections are more sharply defined than others and between several of them there are species which appear to be connecting links; but this is equally true of many well-established natural divisions of plants and does not make it less desirable to group species in such a manner as to indicate their relationships and at the same time to facilitate their study.

CHARACTERS OF THE GENUS.

In all species of *Annona* the leaves are alternate, 2-ranked, entire, and devoid of stipules. The flowers may be solitary or geminate, or they may be clustered in fascicles of several. They are never axillary nor terminal, but are sometimes apparently so by the abortion of an axillary branch from the base of which they issue, or that of a terminal bud, the vestiges of which may be at length almost or entirely lost from the growth being directed to the development of the fruit. In a few cases, as in the common soursop (*Annona muricata*), the inflorescence is caulifloral, issuing from the old bark of the trunks, limbs, or branches.

The typical *Annona* flower has a 3-parted calyx, the lobes of which are valvate in bud. The corolla is composed of 6 petals in 2 series, the inner petals alternating with the outer and consequently opposite the sepals or calyx lobes. In all cases the outer petals are valvate, or edge to edge. In the type species, *Annona muricata* (pl. 1), the overlapping inner petals are broadly ovate and somewhat smaller than the outer. In other species the inner petals are scarcely larger than the

EXPLANATION OF PLATE 1.—Field photograph by G. N. Collins, taken in Porto Rico. Natural size.

stamens, as in *A. squamosa* (fig. 1), or they may be entirely wanting, as in *A. acuminata* (fig. 2). In species where they are normally absent

inner petals sometimes occur, either in the form of small stamen-like bodies with a pair of sterile pollen sacs on their back, or as miniature petals clothed with an indument more or less like that of the outer petals. Sometimes one or more inner petals are abnormally developed and thrust themselves between two of the outer petals, as in the Annonella of Santo Domingo (*Annona rosei*); while in *A. cornifolia* and the closely allied *A. nutans*, to be described hereafter, the flower has a 6-lobed gamopetalous corolla composed of 3 narrow lobes alternating with 3 broad ones, approaching somewhat the structure of a Rollinia flower; and in several species abnormal flowers occur which have a 4-parted calyx and 8 petals or a 2-parted calyx with 4 petals, in each case in 2 series.

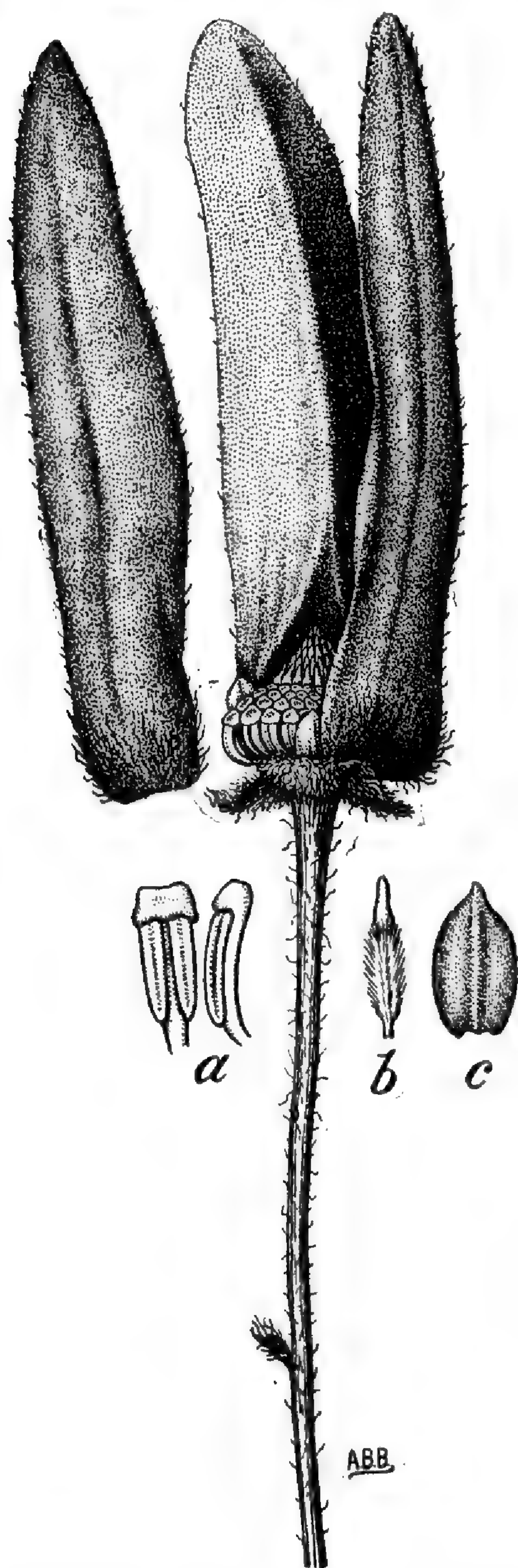


FIG. 1.—Flower of *Annona squamosa*. a, Stamens; b, carpel; c, inner petal. Flower scale 4; a, b, c, scale 6.



FIG. 2.—Flower of *Annona acuminata*. Natural size.

The essential parts (pl. 2) consist of an andrœcium, composed of numerous stamens closely crowded on a convex or conoid receptacle

EXPLANATION OF PLATE 2.—Gynœcium surrounded by andrœcium, A, seen from above; B, from the side, with part removed. Photographed from material in the U. S. National Herbarium by Albert Mann. Scale 6.

(torus), and a gynœcium, composed of a cluster of carpels issuing from its center.

The stamens (fig. 3, *a*) have a short filament, 2 linear, parallel pollen sacs opening extrosely by a longitudinal slit, and a connective usually terminating in a swollen head or hoodlike process above the pollen sacs. These hoods are very closely packed until the flower reaches maturity (pl. 2) and serve like thatch or tiling to protect the pollen from moisture and from fungus spores. In some cases the connective tips are broadly expanded and velvety or clothed with hairs; in others they are fleshy points not exceeding the two pollen sacs in width, as in the section *Annonella* and its allies. In the pollen sacs the pollen grains are arranged in columns of tetrads and are usually of a yellowish color, but sometimes nearly white and sometimes of a deep orange or amber color.

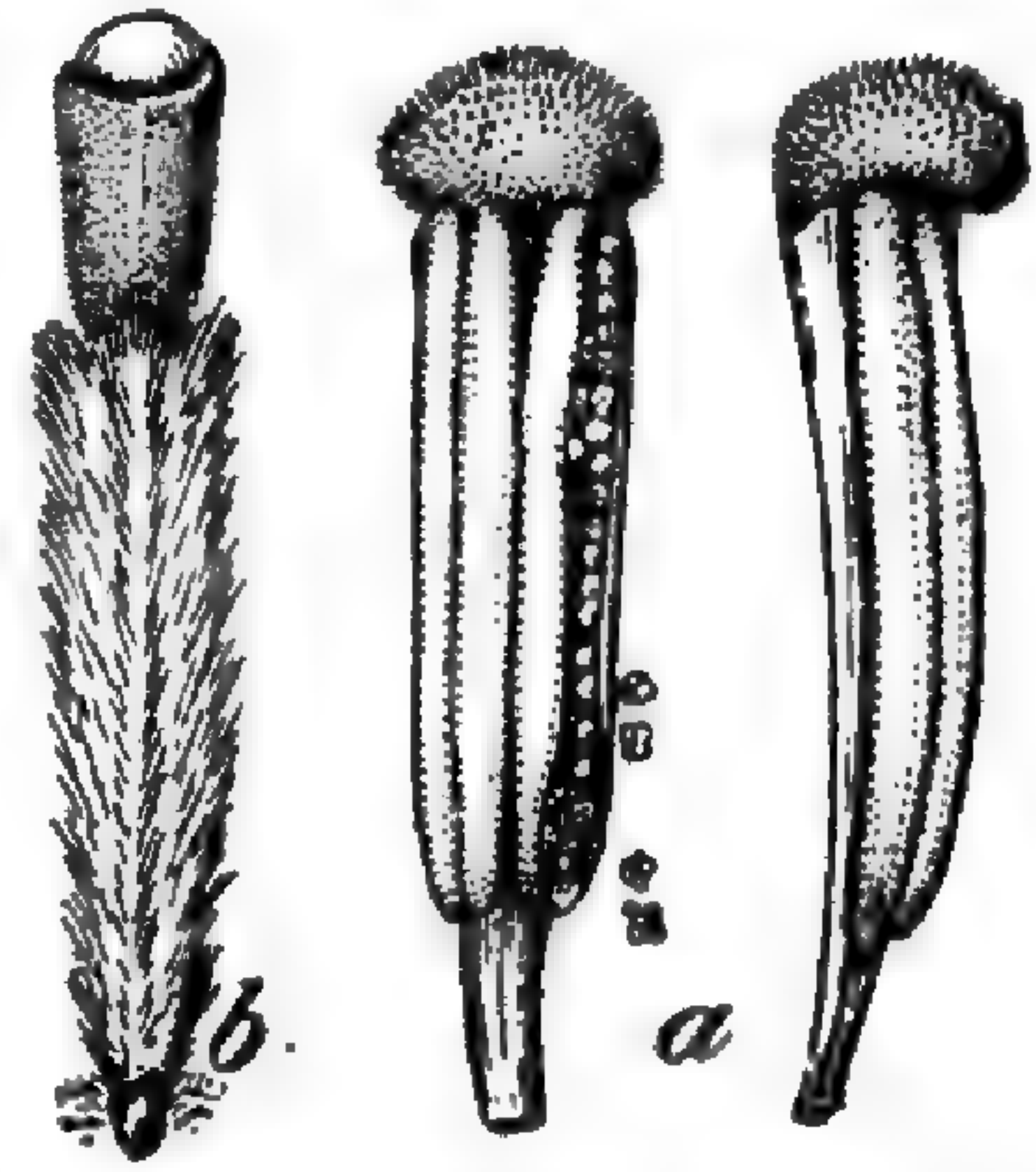


FIG. 3.—Essential parts of the flower of *Annona muricata*. *a*, Stamens, one showing pollen sac dehiscing down the back; *b*, carpel. Scale 10.

The pistils (fig. 3, *b*) each consist of a single carpel. The ovary contains a single basal ovule and is usually clothed with appressed or ascending hairs. In most sections the ovaries are separate in the flower (discrete), as in *Annona muricata* and *A. montana* (pl. 3);

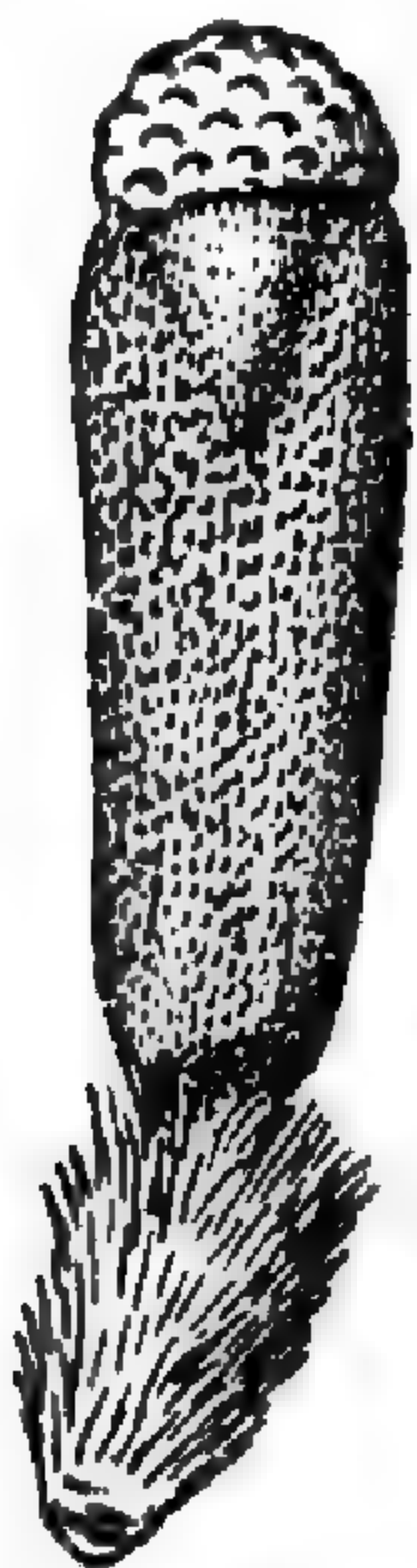


FIG. 4.—Carpel of *Annona jenmanii*. Scale 20.

in a few they are from the beginning united in a solid mass (concrete), as in *A. glabra* (fig. 19, p. 15). The ovaries are sometimes produced into processes which persist in the fruit as fleshy or hard points, as in *A. muricata* (pl. 1) and *A. purpurea*. Sometimes the ovaries are comparatively long and slender, as shown in plate 3; sometimes, as in *A. jenmanii* (fig. 4), the ovary is comparatively short and bears a long, fleshy, club-shaped style terminating in a tuberculate stigma. Usually the outer styles are more robust than the inner ones and their stigmas are more distinctly hairy or muriculate than those of the latter, as in *A. holosericea* and *A. nutans*. These outer styles together with their ovaries have in some cases been mistaken for sterile stamens, but they are

essentially a part of the gynœcium, of which they form the periphery, and the constriction between the style and ovary is usually distinctly marked. No such division or constriction is to be found in the stamens. As the time of pollination approaches a viscous fluid exudes from the stigmas, gluing together the styles and offering a medium

for the development of the pollen. The flowers are proterogynous, the stigmas maturing before the pollen sacs dehisce.

The compound fruit, or syncarpium, is formed by the growing together of the carpels and torus into a fleshy mass, usually of an ovoid, spheroid, or cordiform shape, the individual carpels being indicated on the surface by areoles more or less distinctly outlined either with incised lines, as in *Annona reticulata* (fig. 25, p. 18), or by raised ridges, as in *A. scleroderma* (fig. 22, p. 17), and frequently bearing the produced tips of the ovaries, as in *A. muricata*, *A. purpurea*, and *A. cercocarpa*. The areoles are sometimes swollen or gibbous, with or without a small wart or tubercle near their apex. Sometimes they are quite smooth or very faintly outlined, as in *A. cascarilloides*, *A. glabra*, and smooth varieties of *A. cherimola*. In most cases the fruit is greenish or yellowish when mature; in a few species it is glaucous or pruinose, as in *A. squamosa*; or it may become suffused with red, especially on the sunny side, as in the bullock's heart (*A. reticulata*). In the South American *A. cornifolia* and the closely allied *A. nutans* it is bright orange red.

The seeds have the basal embryo and large ruminant or wrinkled endosperm which characterize all Annonaceae and there is usually a conspicuous swollen caruncle around the hilum. In most species the testa is thin and membranous, revealing the wrinkles of the endosperm beneath, but in *Annona longiflora* and *A. diversifolia* it is thick, hard, and smooth, like the shell of a nut.

GEOGRAPHICAL DISTRIBUTION.

The genus *Annona* is confined almost exclusively to tropical and subtropical America. At an early date, however, certain species were introduced into the warmer regions of the Old World for the sake of their edible fruits, and were described as distinct. In addition to these there are a few species endemic in tropical Africa.

The latter belong apparently to three distinct groups, one of which, consisting of *Annona klainii* Pierre, in which there are sometimes 8 petals and a 4-parted calyx, has been segregated as a section, *Anonastrium*. Another, including *A. senegalensis* Pers. and *A. stenophylla* Engl. & Diels, has been placed in the same section with *A. muricata* L., but departs from that section in having the inner petals narrow and triquetrous, instead of broad and imbricate in aestivation. The third, consisting of *A. glauca* Schum. & Thonn., has both the outer and inner petals broadly ovate, and the coriaceous, subsessile leaves rounded at the apex and narrowed or cuneate at the base. As the present

author has been unable to secure specimens of these African species of *Annona*, he can not with certainty assign them to sections.¹

SPECIES INCORRECTLY REFERRED TO ANNONA.

Several African plants originally described as *Annonas* have been found to be generically distinct; as in the case of *Annona mannii* Oliver and *A. laurentii* Engl. & Diels, which have been placed by Engler and Diels in the genus *Anonidium*. In this genus, the flowers are more or less unisexual, as in *Raimondia*, but the stamens differ radically from those of the latter genus in having the connective thickened and dilated at the extremity over the pollen sacs.

Several American plants were removed from the genus at an early date on account of peculiarities of their flowers or fruits, as in the case of *Rollinia mucosa* and *R. silvatica* and several species of *Duguetia*. A few others are undoubtedly distinct and should be raised to generic rank, as has been done in the case of *Anonidium*; among them, *Annona longifolia* Aubl. and *A. rhizantha* Eichl., the latter of which bears the same relation to the genus *Duguetia* that *Raimondia* bears to *Annona*. Included in material recently received from M. Augustin De Candolle the author finds a species, described by Kunth under the name of *Annona quinduensis*, which, on account of its peculiar stamens and unisexual flowers, must be assigned to the recently described genus *Raimondia*. Of this species an amended description is given hereafter, together with descriptions of two new genera: *Geanthemum*, already recognized as a distinct section by Robert E. Fries, and *Fusaea*, based upon Baillon's section of the

¹ Since writing the above the author has received, through the kindness of Professor Urban, a series of fine specimens of African *Annonas* from the Berlin Herbarium, including original specimens, or type material, of *Annona klainii* Pierre. He was surprised to find this species very closely allied to *A. glabra* L. (*A. palustris* L.), which also occurs on the east coast of Africa, in the same region as that in which *A. klainii* was collected. It is possible that the type of the latter species is an abnormal specimen of *A. glabra*, which not infrequently has a 4-parted calyx and 8 petals in 2 series of 4, both the inner and outer series valvate in æstivation. *Annona senegalensis* Pers. is remarkably variable, occurring sometimes as a small shrub less than a meter high, and sometimes as a large tree, as in the form occurring in the vicinity of Lindi, on the east coast of Africa (Busse, nos. 2823, 2990^a). The flowers are 6-petaled, with the inner petals narrow, connivent, their tips meeting above the center of the gynœcium. The seeds are small, oblong, hard, smooth, and glossy, with relatively large caruncles at the base, somewhat like those of *A. cornifolia* and *A. nutans* of southern Brazil and Paraguay. It is possible that the species *A. senegalensis* as now understood may be found to be composed of several species. Certainly several of the forms show more decided differences than those which separate *A. klainii* from *A. glabra* or some of the South American species allied to *A. tomentosa* R. E. Fries from one another. *Annona glauca* Schum. & Thonn. is a well-defined species quite distinct from *A. senegalensis*.

same name. In addition to these must be mentioned *Annona sessiliflora* Benth., which proves to belong to the genus *Guatteria* and must take the name *Guatteria sessiliflora* (Benth.).

SCHEME OF THE PROPOSED SUBDIVISIONS.

Group I. GUANABANI (SOURSOPS).

Section 1. Euannona. Type species, *Annona muricata* L.

Section 2. Psammogenia. Type species, *Annona salzmanni* A. DC.

Section 3. Ulocarpus. Type species, *Annona purpurea* Moc. & Sessé.

Group II. PILAEFLORAE (SILKY ANNONAS).

Section 4. Helogenia. Type species, *Annona paludosa* Aubl.

Section 5. Pilannona. Type species, *Annona sericea* Dunal.

Section 6. Gamopetalum. Type species, *Annona cornifolia* St. Hil.

Group III. ACUTIFLORAE (SHARP-PETALED ANNONAS).

Section 7. Phelloxylon. Type species, *Annona glabra* L.

Section 8. Atractanthus. Type species, *Annona acutiflora* Mart.

Group IV. ATTAE (CUSTARD APPLES).

Section 9. Chelonocarpus. Type species, *Annona scleroderma* Safford.

Section 10. Atta. Type species, *Annona squamosa* L.

Section 11. Ilama. Type species, *Annona diversifolia* Safford.

Section 12. Saxigena. Type species, *Annona bullata* A. Rich.

Group V. ANNONELLAE (DWARF ANNONAS).

Section 13. Annonula. Type species, *Annona cascarilloides* Wright.

Section 14. Annonella. Type species, *Annona globiflora* Schlecht.

KEY TO THE GROUPS.

Flowers subglobose or broadly pyramidal in bud.

Corolla 6-petaled; petals broad, in 2 series.

Inner petals imbricate..... I. GUANABANI (p. 6).

Inner petals valvate..... III. ACUTIFLORAE (p. 14).

Corolla 3-petaled or, if 6-petaled, inner petals much narrower than outer or rudimentary.

Apex of the connective broadly expanded above the pollen sacs; flowers of medium size..... II. PILAEFLORAE (p. 10).

Apex of the connective not broadly expanded, scarcely exceeding the pollen sacs in width; flowers small..... V. ANNONELLAE (p. 21).

Flowers elongate and more or less triquetrous in bud.....

IV. ATTAE (p. 16).

CHARACTERS OF THE GROUPS AND SECTIONS.

Group I. GUANABANI (SOURSOPS).

(Section Guanabani Mart., in part.)

Flower buds subglobose or broadly pyramidal; flowers large; petals 6, the outer valvate, thick, broadly ovate and usually cordate, the inner somewhat smaller, with the edges thinner and overlapping (imbricate), forming a dome-like covering over the essential parts, usually clawed at the base.

KEY TO THE SECTIONS.

Leaves with minute pockets or pits in the axils of

the lateral nerves..... 1. EUANNONA (p. 7).

Leaves without pockets in the axils of the nerves.

Blades flat, thick, coriaceous, the lateral nerves impressed on both surfaces----- 2. *PSAMMOGENIA* (p. 8).

Blades more or less conduplicate and undulate, submembranaceous, the lateral nerves impressed above, very prominent beneath_ 3. *ULOCARPUS* (p. 9).

Section 1. EUANNONA Safford.

(Guanabani Mart. in part. Euannona Safford, Journ. Washington Acad. Sci. 1: 118. 1911, restricted.)

Type species, *Annona muricata* L. (pl. 1).

This section is distinguished from all other sections of the genus *Annona* by minute pits or pockets in the axils of the lateral nerves of the leaves (fig. 5), sometimes quite conspicuous, as in the case of *Annona montana* Macfad., but often scarcely visible to the naked eye. The peduncles are solitary or geminate, in the type species frequently caulifloral, the flowers large, 6-petaled, the 3 outer petals thick, valvate, broadly ovate, usually cordate at the base and acute or acuminate at the apex. The 3 inner petals are somewhat smaller and thinner, concave, with their edges imbricate or overlapping and forming a dome-like covering for the essential parts (pl. 6), obovate or suborbicular, obtuse or rounded at the apex, and

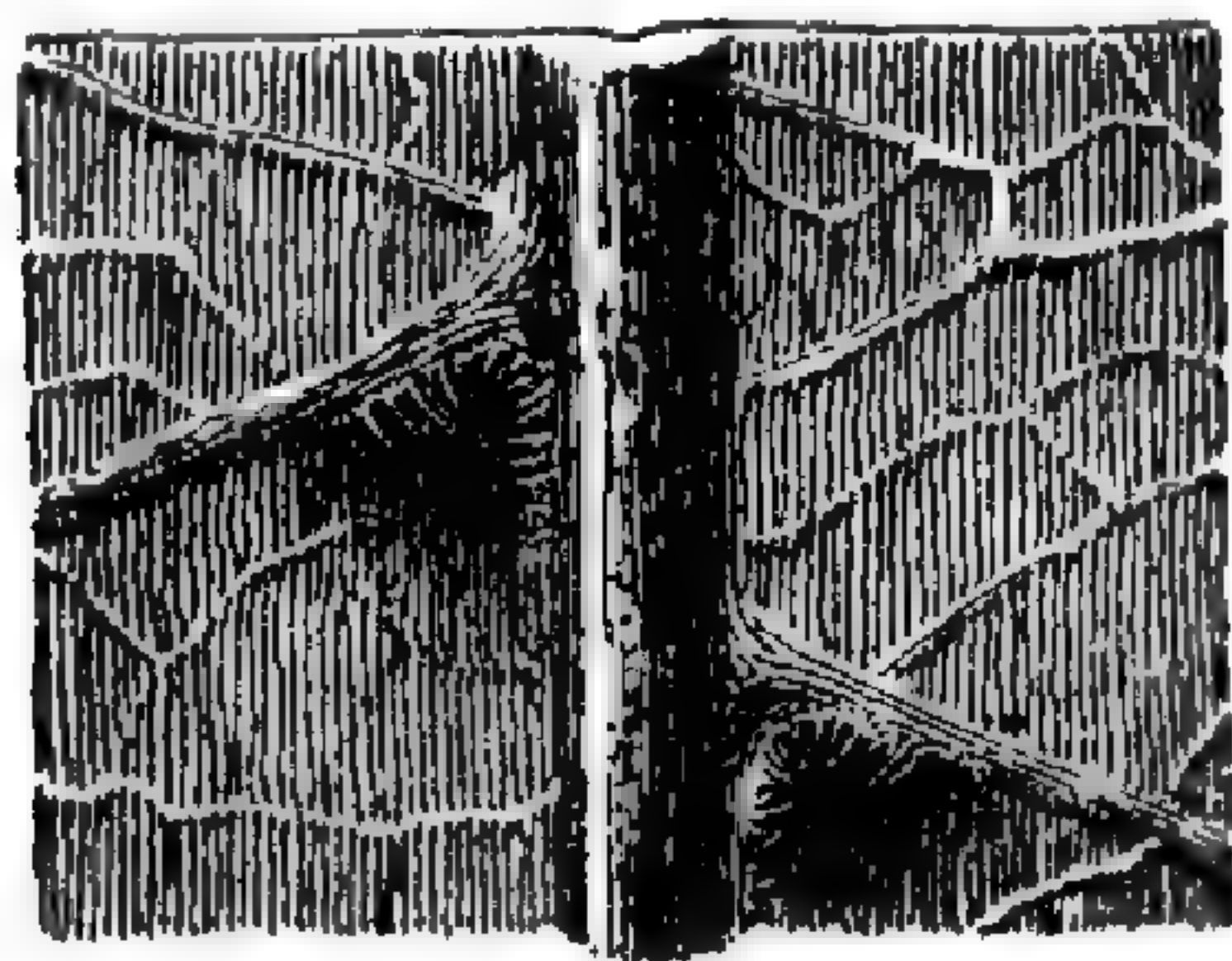


FIG. 5.—Leaf of *Annona montana*, showing axillary pockets. Scale 4.

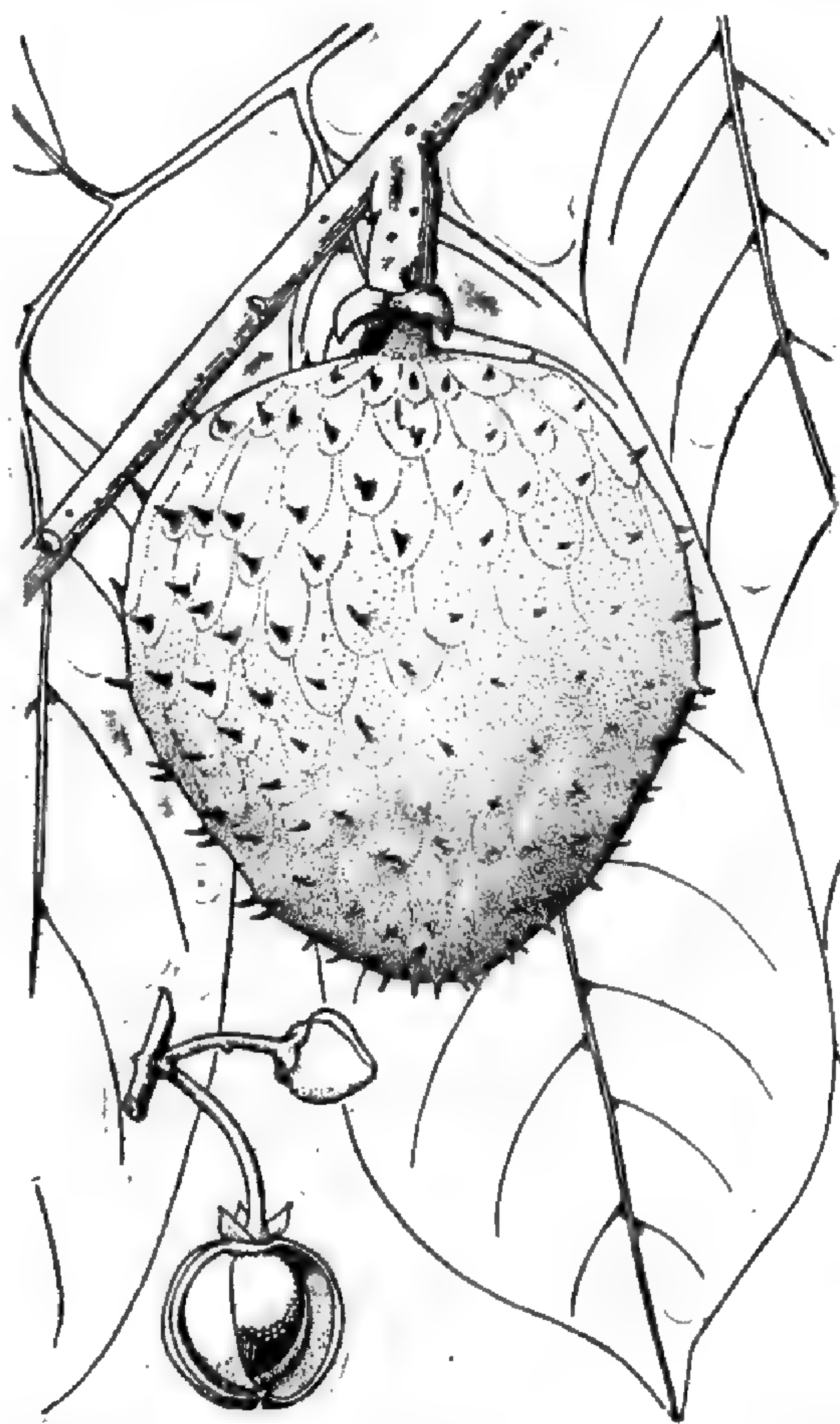


FIG. 6.—*Annona montana*. Flower, fruit, and leaves. Scale $\frac{1}{2}$.

usually clawed at the base. The ovaries are linear and clothed with hairs, a solitary ovule at the base and an ovoid or oblong style at the apex (fig. 3, *b*), and are quite distinct (discrete) in the flower (pl. 3). The fleshy fruit (syncarpium) is muricate with fleshy prickles (fig. 6), consisting of the persistent tips of the ovaries from which the jointed styles become detached soon after pollination.

In addition to *Annona muricata* L., which has been cultivated from pre-historic times for the sake of its pleasantly acidulous, juicy fruit, this section includes several very closely related wild species, the first of which to receive a binary Latin name in accordance with botanical usage was *Annona montana*

EXPLANATION OF PLATE 3.—Showing discrete ovaries of the section Euannona. Photographed from material in the U. S. National Herbarium by W. S. Clime. Scale 6.

Macfad., the "wild soursop" of the West Indies (pl. 7). Very closely allied to this are *A. sphaerocarpa* Splitg., the "bosch-zuurzak," or wild soursop of Surinam (pl. 8, B), and *A. marcgravii* Mart., based upon the Brazilian "araticú ponhê" described by Marcgrave in 1648 (pl. 10). These species will be discussed later, together with the question as to the identity of Marcgrave's "araticú apé," a species closely resembling *A. muricata*. Other species belonging to this section are *A. coriacea* Mart. and the dwarf *A. pygmaea* Warming (fig. 7).

The section *Euannona* differs from the section *Guanabani*, hitherto accepted by botanists, chiefly in the elimination of *Annona glabra* L., in which the ovaries are fused together in the flower, on account of which the writer has made it the type of a section *Phelloxylon*, described below. The African *Annona*



FIG. 7.—*Annona pygmaea*. s, s, Surface of soil; A, calyx seen from above; B, outer petal; C, inner petal; D, stamens; E, hairy ovary tipped with fleshy style; F, flower deprived of its petals and part of its stamens. Reproduced from Warming.

senegalensis Pers. and *A. stenophylla* Engl. & Diels, are also excluded on account of their narrow, triquetrous inner petals.

Section 2. PSAMMOGENIA sect. nov.

Type species, *Annona salzmanni* A. DC. (fig. 8; pl. 11).

The flowers of this section bear a close resemblance to those of *Euannona* and, as in that section, they are sometimes geminate. The leaves, however, in their coriaceous texture and their peculiar nerves, which appear to be impressed on both surfaces instead of being more or less prominent beneath, differ from the leaves of *Euannona* and from all other sections of the genus.

The appressed-pilose ovaries with the terminal style very much constricted at the base resemble those of the section *Euannona* (fig. 7, *E*) and differ from those of the sections *Phelloxylon* and *Chelonocarpus*, in which the ovaries are fused together even in the early stages of the flower; and the section is further separated from *Phelloxylon* by the form of the inner petals, which are not valvate.

Section 3. ULOCARPUS sect. nov.

Type species, *Annona purpurea* Moc. & Sessé (pls. 12-14).

In this section the flowers are very much like those of *Euannona*, with their thick, valvate outer petals and their concave, imbricate inner ones which form a domelike canopy over the essential parts (fig. 9), but the ovaries are relatively shorter and the styles longer and more robust (fig. 10, *b*) and the velvety, truncate extremities of the connectives of the stamens form a very close waterproof covering above the pollen sacs (pl. 2). The leaves in this section also are quite different in form and texture, and they sometimes reach a very large size, as in the type species of the section and the closely allied *A. involucrata* Baill. They are also deciduous and are quite devoid of the pits in the axils of the nerves, which characterize the section *Euannona*. The inflores-

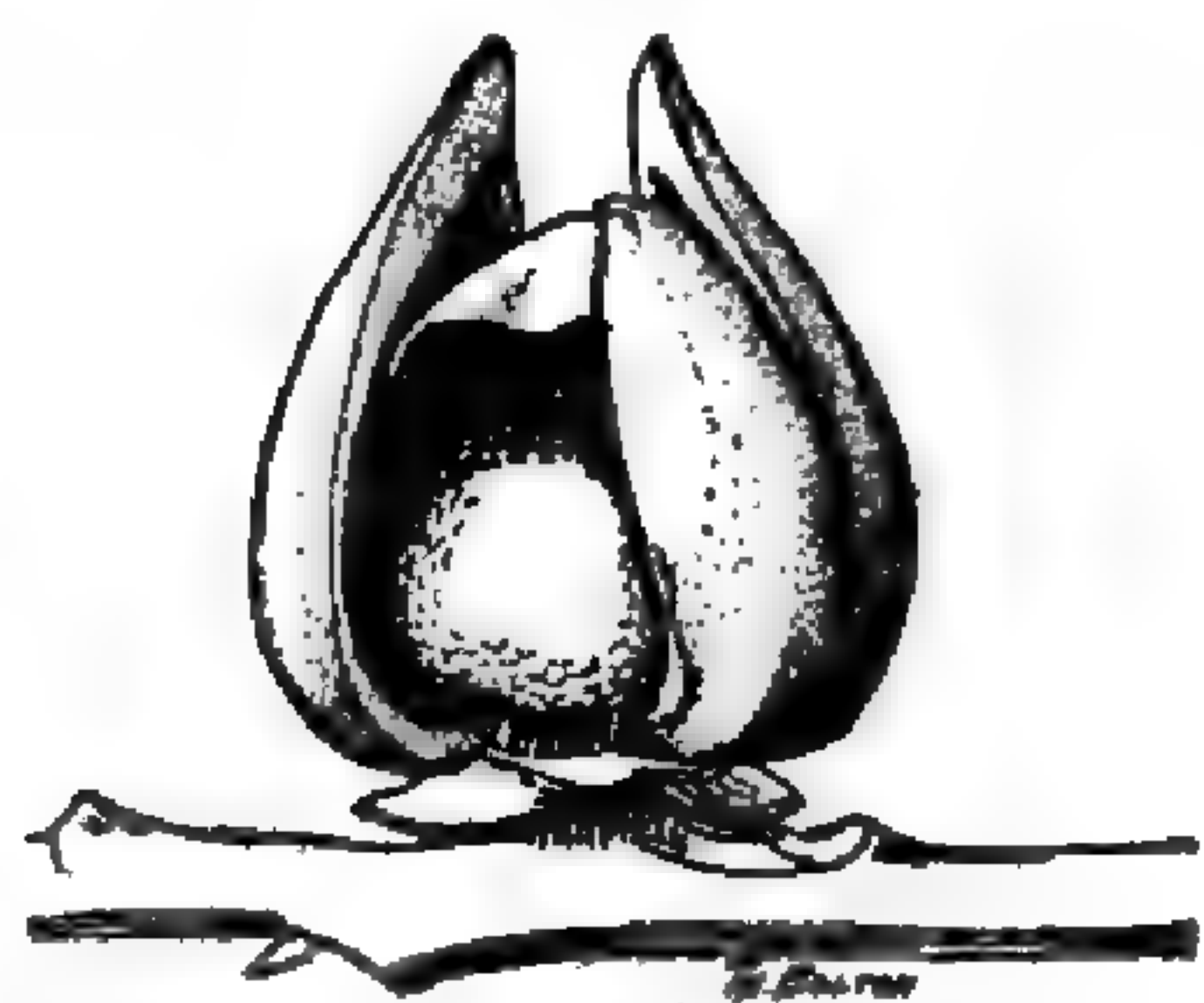


FIG. 9.—Flower of *Annona purpurea*. One inner and one outer petal removed. Scale $\frac{1}{2}$.

cence is peculiar, further, from the fact that it is enveloped when young with imbricated bracts (fig. 11), which, in *A. purpurea* and *A. involucrata*, persist in a more or less perfect state like a second calyx beneath the true calyx. The leaves of the type species bear a resemblance to those of *A. paludosa* Aubl., the type of the next section in order, which may be regarded as a connecting link between the *Pilaeeflorae*, or silky Annonas, and the Guanabani or soursops. The fruits, commonly called "cabezas de negro" (negro heads), differ from those of *Euannona* in having the protuberances of a pyramidal shape, rigid, and covered with a feltlike indument, with a median groove on the side opposite the peduncle. In the opinion of the author *Annona crassiflora* Mart., together with the plants described and figured by Barbosa Rodrigues under

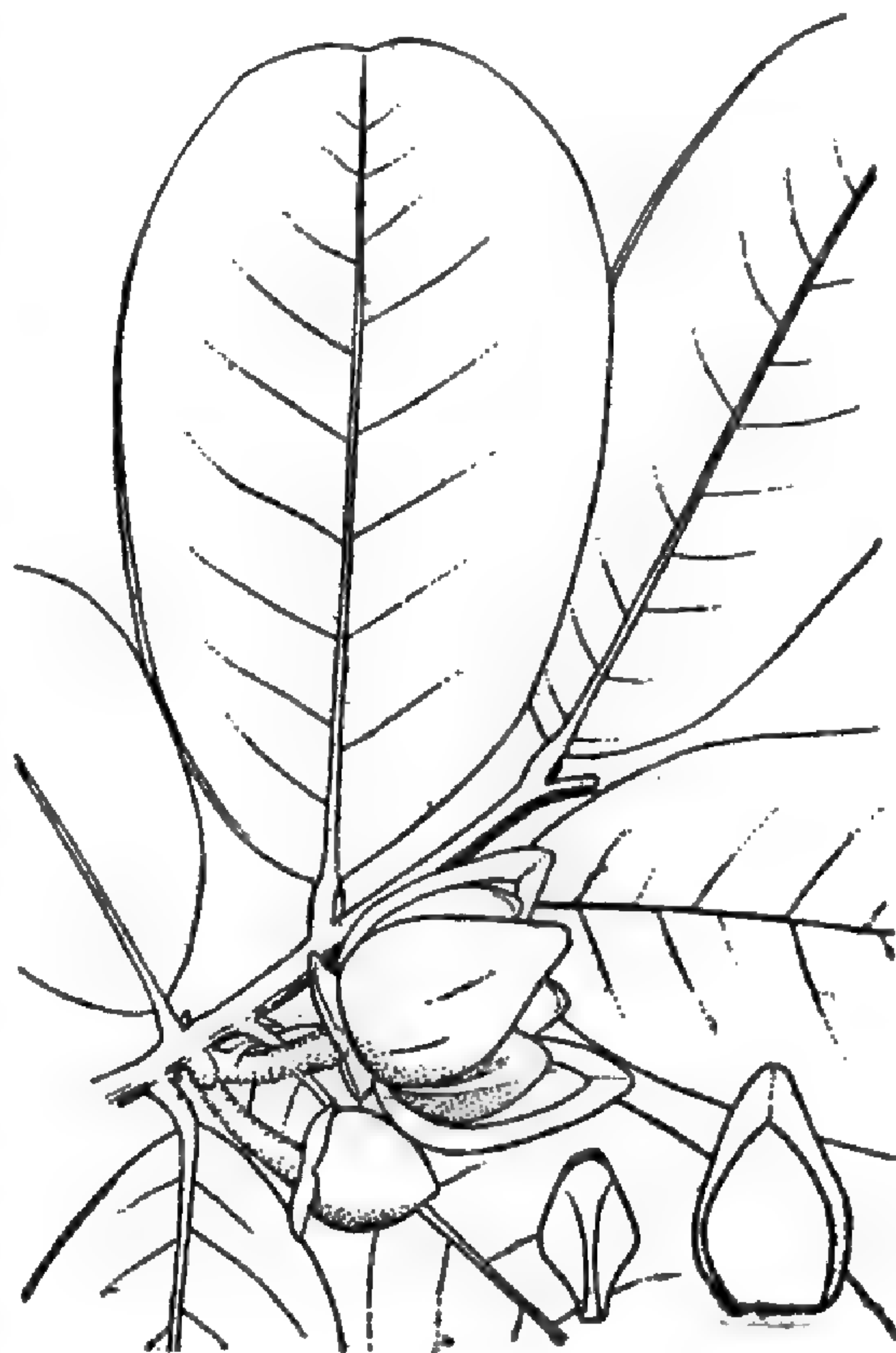


FIG. 8.—*Annona salzmanni*. Leaves and geminate flowers, an inner and an outer petal below. From type specimen in the De Candolle Herbarium. Scale $\frac{1}{2}$.

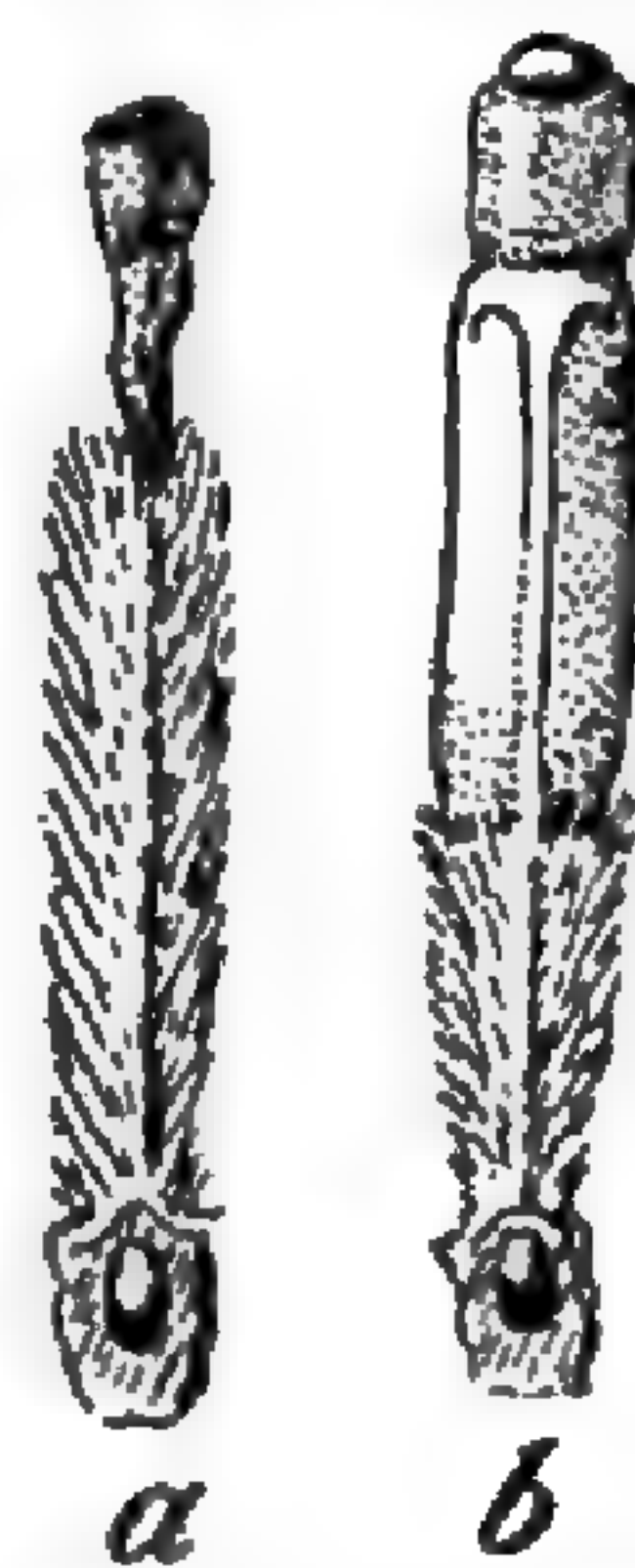


FIG. 10.—Carpels (a) of *Annona montana* and (b) of *A. purpurea*. Scale 5.

the names *Annona rodriguesii* (figs. 12, 13) and *A. macrocarpa*, belong to this section.

Some confusion exists as to the identity of *Annona rodriguesii* and *A. macrocarpa*, described by Rodrigues, both of which are referred by Robert E.

Fries to Martius's *A. crassiflora*. It is not surprising that Rodrigues should have been misled, for the plant figured by Martius as *A. crassiflora*¹ does not correspond with his description of that species. According to the latter the fruit of *A. crassiflora* is a typical *cabeza de negro*, with "sharply umbonate" areoles and not smooth as depicted in the figure, and the leaves "shortly and obtusely acuminate or rounded at the apex," instead of emarginate, while the recurved peduncles, $\frac{1}{2}$ inch long, shown in the figure, correspond with Martius's description of his *A. coriacea*.

As seen by the accompanying illustrations (figs. 12, 13) the flower of *Annona rodriguesii* has very thick outer petals and smaller inner petals, very much as in *A. purpurea*, and the large subglobose fruit with its grooved, stout protuberances is also much like that of the Venezuelan *manirote* (*A. purpurea*). Its pulp is described as very fragrant when

ripe, of an agreeable sweet taste, and so aromatic that it imparts a spicy odor to the urine of those who eat of it in abundance.

The name of this section is suggested by the form of the fruits, the protuberances of which, like short crisp curls, have caused them to be named "*cabeza de negro*," or "negro-head."

GROUP II. PILAEFLORAE (SILKY ANNONAS).

(Section *Pilaeflorae* Mart., amended.)

Flower buds globose or depressed-globose (oblate); petals 3 or 6, the outer broadly ovate or orbicular, concave, valvate (except in section 6), and in most cases sericeous-pubescent on the outside, the inner when present much narrower and somewhat shorter than the outer, neither valvate nor imbricate, but performing the function of weather strips to cover the cracks between the outer petals; in section 6 the outer and inner petals united to form a 6-lobed gamopetalous corolla, the 3 outer broad petals open in estivation and overlapping the edges of the 3 inner and narrower lobes.

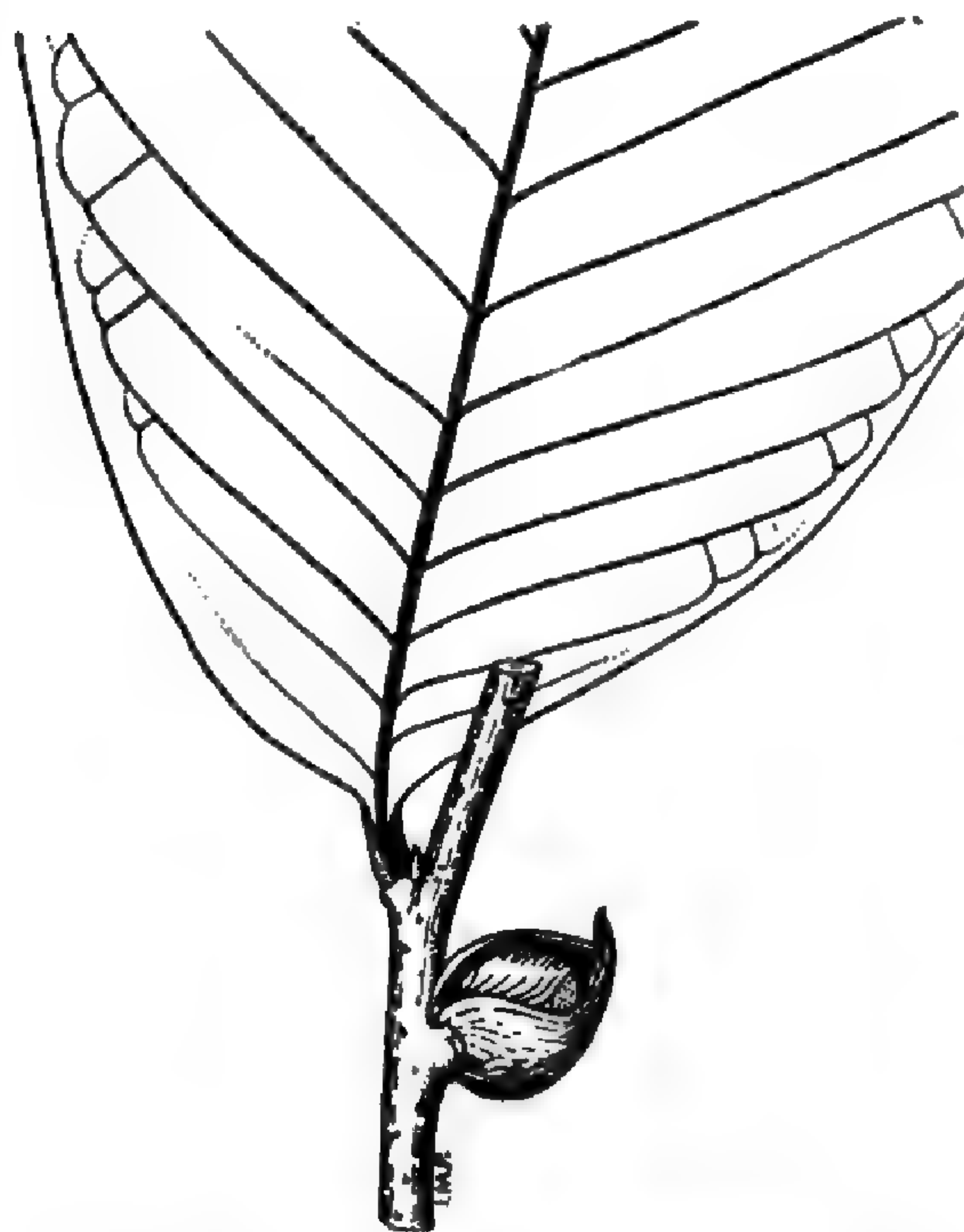


FIG. 11.—*Annona involucrata*, showing involucre of inflorescence. From specimen in U. S. National Herbarium. Scale $\frac{1}{2}$.

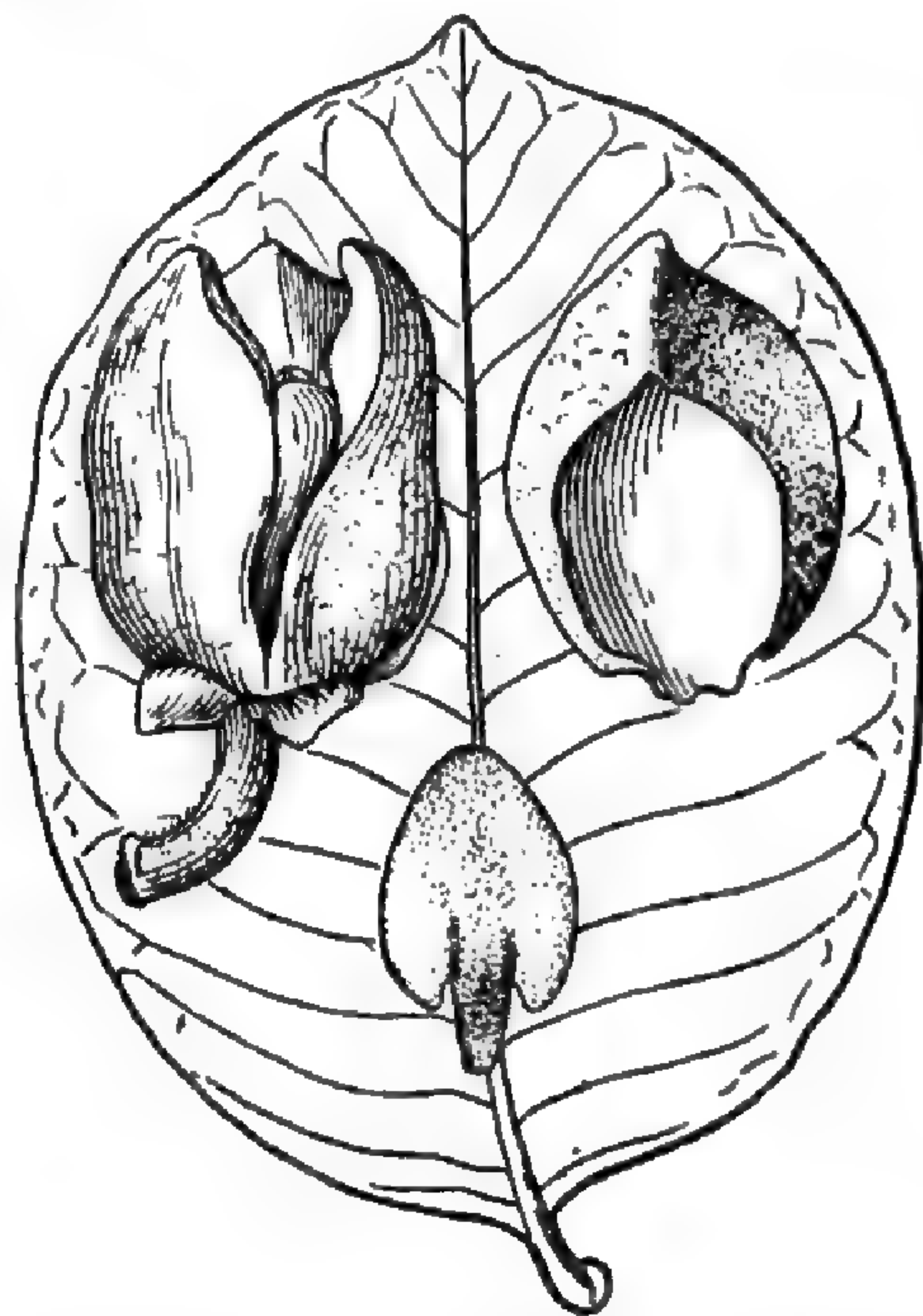


FIG. 12.—Leaf and flower of *Annona rodriguesii*. After Rodrigues. Scale $\frac{1}{2}$.

¹ Mart. Fl. Bras. 13¹: pl. 2. 1841.

KEY TO THE SECTIONS.

- Corolla gamopetalous, 6-lobed..... 6. GAMOPETALUM (p. 13).
 Corolla polypetalous.
 Petals normally 3, broadly ovate or suborbicular, concave; inner petals when present more or less imperfect..... 5. PILANNOA (p. 12).
 Petals normally 6, the outer ones broadly ovate or suborbicular, the inner ones oblong or linear..... 4. HELOGENIA (p. 11).

Section 4. HELOGENIA sect. nov.

Type species, *Annona paludosa* Aubl. (pl. 17; fig. 14).

This appears to be intermediate between the Guanabani and the *Pilaeflorae* and may be regarded as a link connecting the two groups. From the former

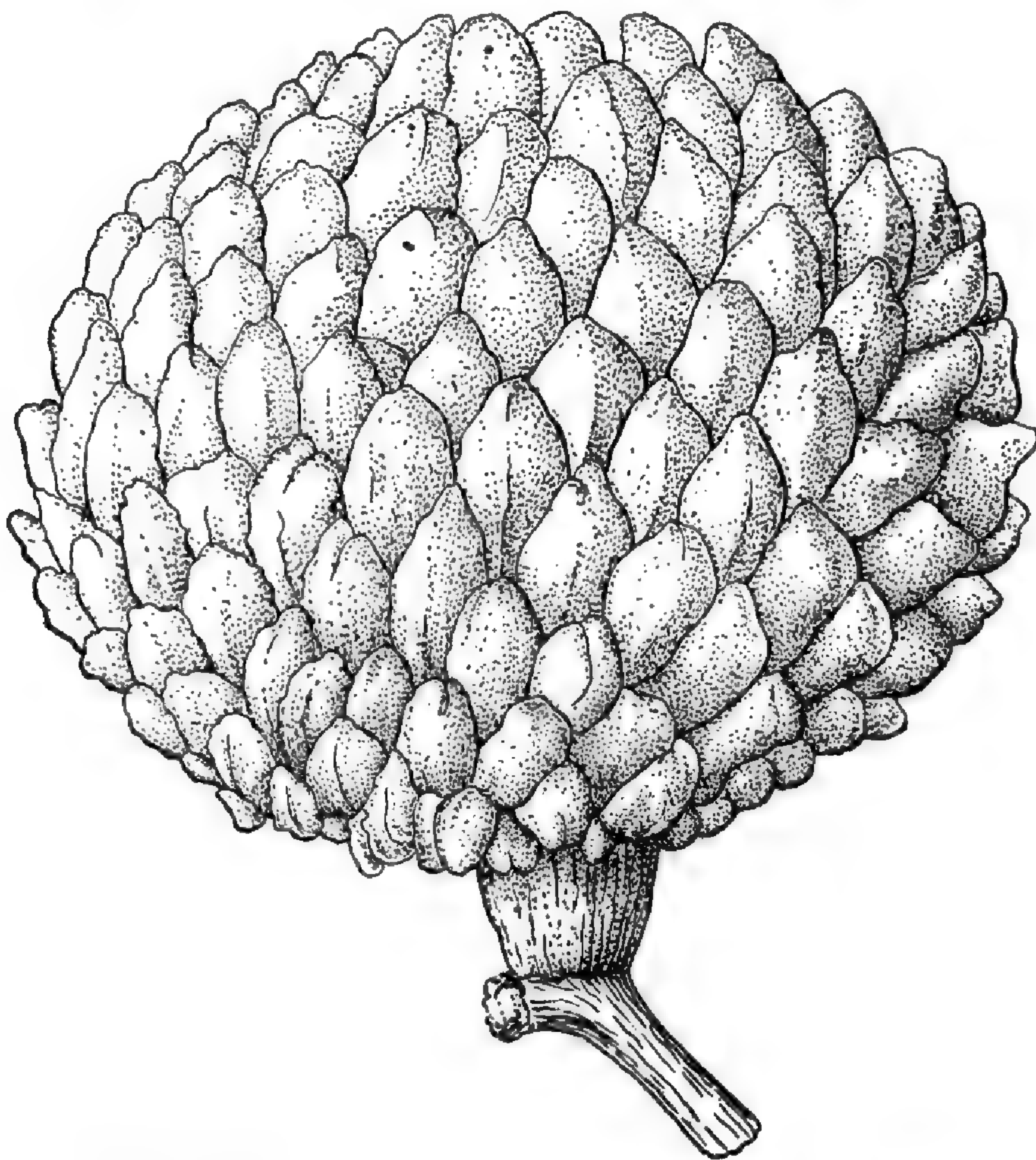


FIG. 13.—Fruit of *Annona rodriguesii*. After Rodrigues. Scale $\frac{1}{2}$.

it differs in having the narrow, lanceolate or linear inner petals of the present group. From *Pilannona* it differs in having the corolla normally 6-petaled instead of 3-petaled. The texture of the leaves (pl. 17) suggests affinities with both *Annona purpurea* (section *Ulocarpus*) and *A. jenmanii* (section *Pilannona*), and that it is really allied to these two sections is indicated by the character of the stamens and carpels, as well as by the muricate fruit.

The name *Helogenia* is suggested by the habitat of the type species, which grows in swamps. Other species included in the section are perhaps xero-

phytic and may perhaps not be very closely related to the type. They are placed here, however, on account of their narrow inner petals, which, like those of *A. paludosa*, are neither imbricate nor valvate. Among them are *A. crotonifolia* Mart., *A. tomentosa* R. E. Fries, and *A. malmeana* R. E. Fries.

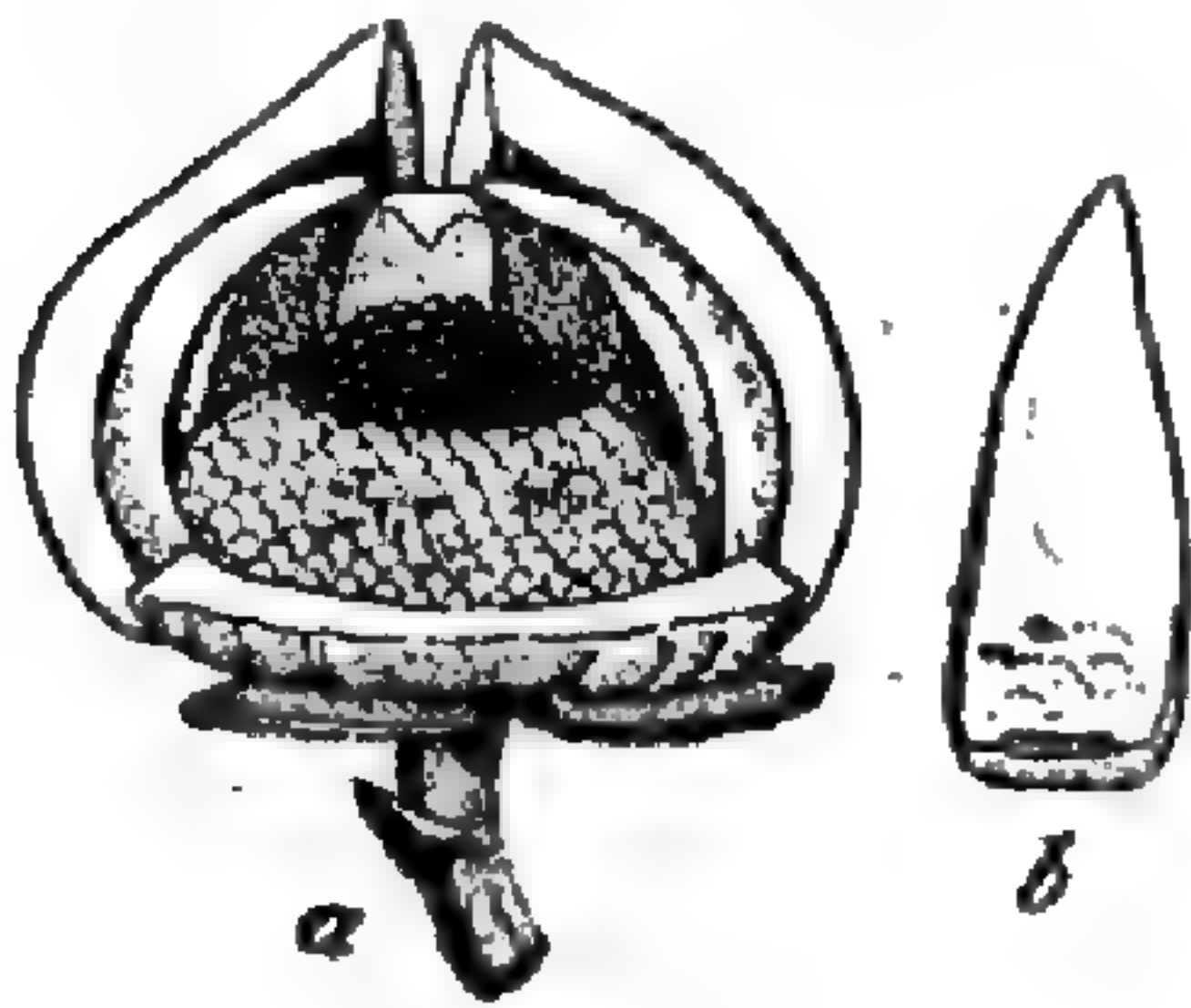


FIG. 14.—Flower of *Annona paludosa*. *a*, Flower, one outer petal removed; *b*, an inner petal.

Section 5. PILANNONA Safford.¹

Type species, *Annona sericea* Dunal (fig. 15).

In this section the flowers are normally 3-petaled, but sometimes are provided with more or less imperfect inner petals like those of *A. paludosa* Aubl. The connectives of the stamens are expanded into a broad head, which is usually muriculate with fine glossy points and sometimes bears straight or slightly curved diaphanous hairs. The gynæcium is usually a solidified mass of carpels, the tips of the styles forming a convex or disklike area composed of minutely tuberculate stigmas, very much as in *A. paludosa*; or the stigmas may be clothed with hairs, as in *A. holosericea* (fig. 16). The fruit is usually velvety and covered with projections, though in some cases (as in *A. longipes* Safford) the latter are reduced to appressed points. In addition to the

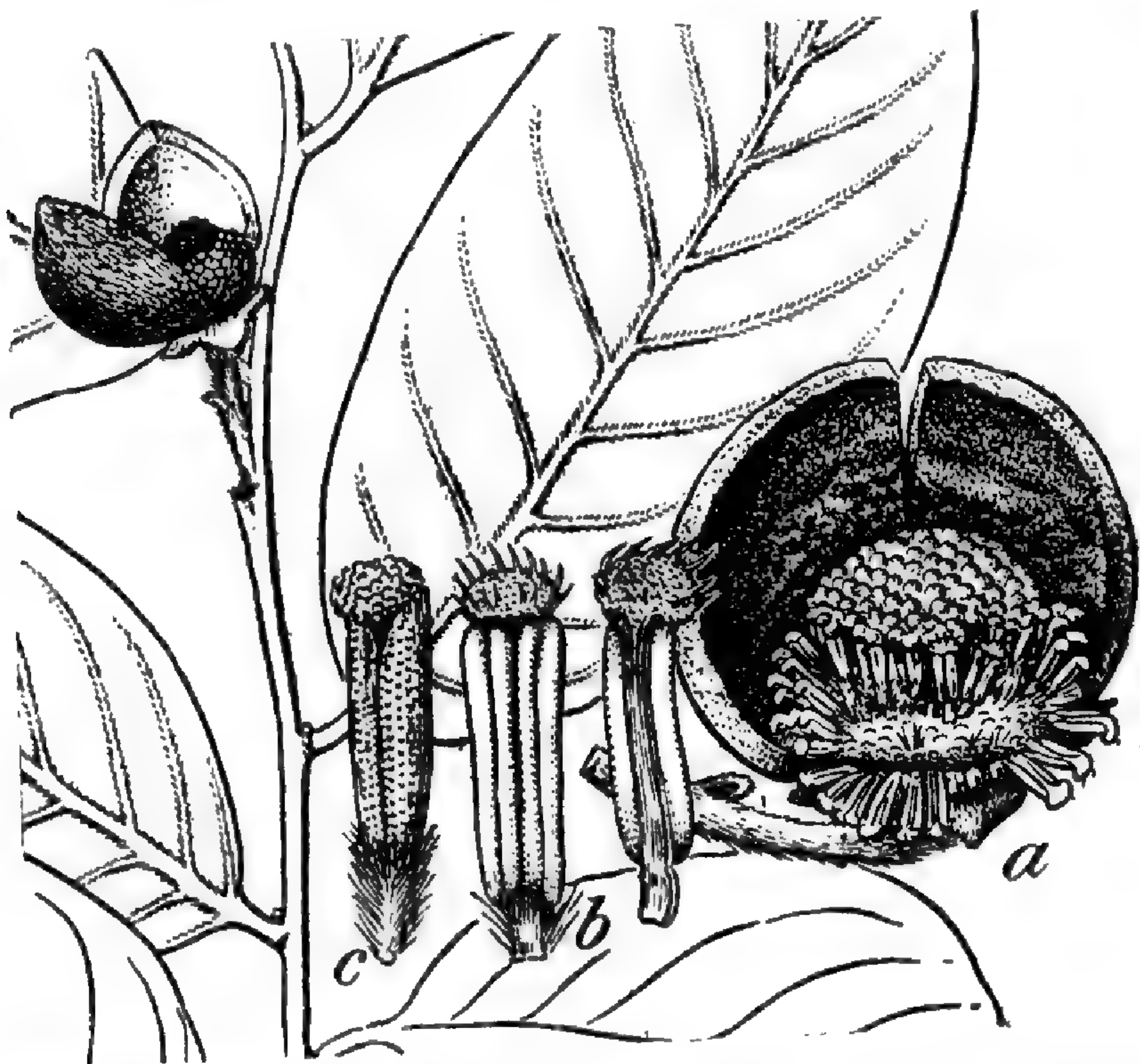


FIG. 15.—Flower and essential parts of *Annona sericea*. *a*, Flower with petal removed; *b*, stamens; *c*, carpel. From type material. *a*, Scale 3; *b*, *c*, scale 15.

species assigned to this section in the publication cited above, may be mentioned *Annona sancta-crucis* S. Moore, which has edible fruits about the size of an orange, *A. scandens* Diels, with small, oblong, velvety fruit, collected near Tarpoto, Peru, by Ule (no. 6521), and *A. hypoglauca* Mart. with flowers in clusters of 2 to 4.

¹ Contr. U. S. Nat. Herb. 16: 264. 1913.

Section 6. GAMOPETALUM sect. nov.

Type species, *Annona cornifolia* St. Hil. (pls. 18, A, 20).

This section is distinguished from all others by its gamopetalous flowers, the corolla (fig. 17) being composed of 3 broad and 3 narrow lobes, the edges of the latter, corresponding to inner petals, lapped over by those of the former. It is further distinguished by the connectives of the stamens (fig. 17, c), which have a broad terminal head expanded above the pollen sacs and echinulate, very much like those of the section *Pilannona*; by the ovaries, which (fig. 17, d) are quadrangular-prismatic and very closely crowded but distinct in the flower; and by the fleshy, 4-cornered styles, constricted at the base, terminating in swollen, ovoid or spheroid stigmas, those on the periphery of the gynœcium being velvety or clothed with minute glandular hairs, the inner ones less hairy

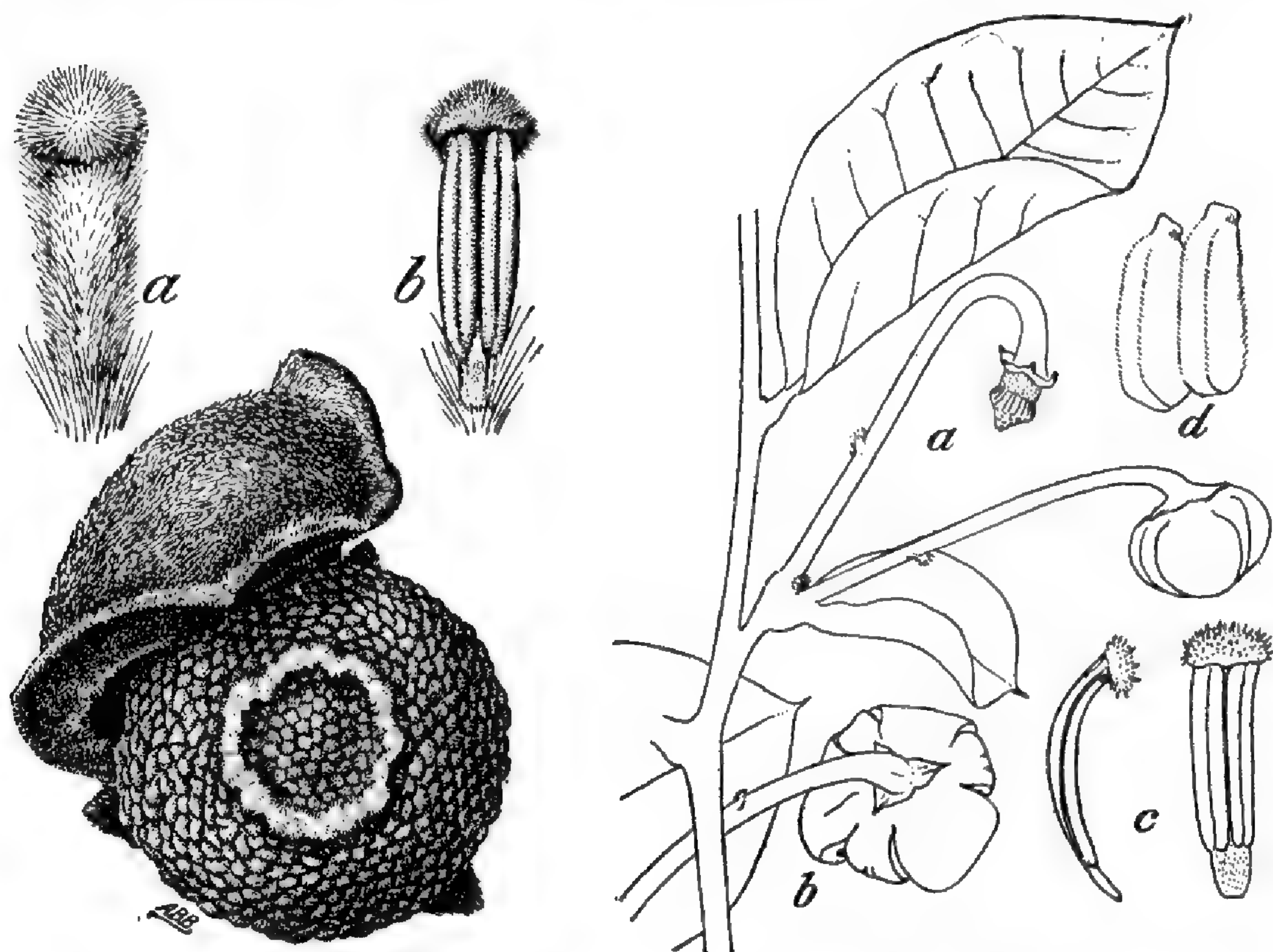


FIG. 16.—Flower of *Annona holosericea*, with two petals removed. a, Carpel; b, stamen. From type specimen. Flower, scale 4; a, b, scale 12.

FIG. 17.—*Annona nutans* and *A. cornifolia*. a, Twig of *Annona nutans* with geminate flowers; b, leaf and flower of *A. cornifolia*; c, stamens, and d, ovaries of *A. nutans*. a, b, Natural size; c, scale 10; d, scale 20.

or minutely papillose, all of them cemented in a solid mass after pollination and soon becoming detached from the ovaries. From the peculiarities of the essential parts and from the general habit of growth this section appears to be allied to *Pilannona*; in the gamopetalous corolla it seems to form a link between the genera *Annona* and *Rollinia*. In addition to the type this section includes the closely allied *Annona nutans* Fries, of Paraguay (pl. 21), *A. spinescens* Mart., and probably *A. walkeri* S. Moore. *Annona fagifolia* St. Hil. & Tul. of Southern Brazil, is also gamopetalous, the 3 inner petals adnate to the outer connate petals near the base. This species, though not very close to *A. cornifolia*, must also be placed in this section. The fruit of the type species is about the size of a hen's egg, ovate-globose, and of a bright orange red color

when ripe, with the component carpels tuberculate and often terminating in a point. The seeds are short and broad with conspicuous caruncles, very much like those of the African *A. senegalensis*.

Group III. ACUTIFLORAE (SHARP-PETALED ANNONAS).

(Section Acutiflorae Mart. in part.)

Petals 6, ovate or lanceolate, both outer and inner petals valvate, acute.

KEY TO THE SECTIONS.

Flower buds depressed conoid or pyramidal; leaves subcoriaceous, glossy laurel-like----- 7. PHELLOXYLON (p. 14).

Flower buds more or less fusiform or conoid-acuminate; leaves membranaceous----- 8. ATRACTANTHUS (p. 15).

Section 7. PHELLOXYLON sect. nov.

Type species, *Annona glabra* L. (pl. 4; figs. 18-20).

In this section the corolla bears a superficial resemblance to that of *Euannona*, but the inner petals are acute and valvate (fig. 19) and the venation of the coriaceous, glossy, laurel-like leaves is quite distinct, conspicuously

reticulate when dry and lacking the minute axillary pockets of *Annona muricata* and its allies. The chief peculiarity of this section, however, is the form of its gynœcium (fig. 20), which has the ovaries closely cemented together even in the flower. The wood, especially that of the roots, is very light and corklike and is used for floats of fishing nets and for stoppers of bottles. It is commonly known as "cork-wood" and this name has suggested that which is here proposed for the section. The fruit (pl. 4) is smooth and apple-like in appearance, with the areoles only faintly indicated on the surface.

This section is typified by a species, which was described by Linnaeus under two distinct botanical names: First, as *Annona glabra*, in the first edition of his *Species Plantarum* (1753), his description being based on Catesby's figure of a plant growing in the Bahama Islands; afterwards, as *Annona palustris*, in the second edition of his *Species Plantarum* (1762), his description being based on Sir Hans Sloane's

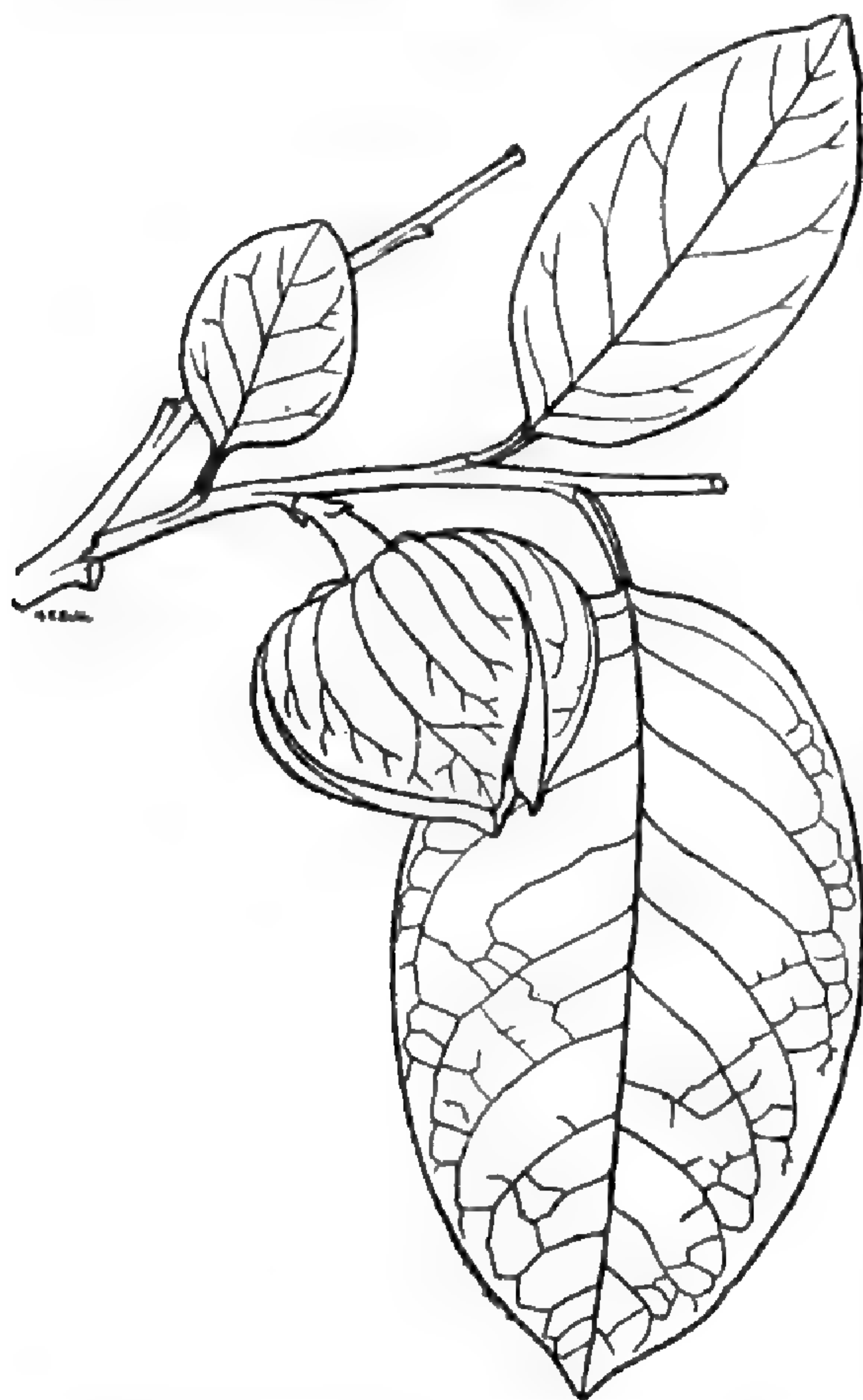


FIG. 18.—Flower of *Annona glabra*, from Miami, Florida. From specimen in herbarium of the New York Botanical Garden. Scale $\frac{1}{2}$.

account of specimens of the Jamaican "water apple" growing "at and above the bridge over the Black-River in St. Dorothy's." Fortunately the localities in which the type plants of both descriptions grew are definitely fixed and many specimens from both localities are to be found in herbaria, especially in the Herbarium of the New York Botanical Garden. Those of each locality show

EXPLANATION OF PLATE 4.—Fruit and flower bud, photographed in Venezuela by H. Pittier. Natural size.

considerable variation in the size of the leaves and the flowers, but a careful comparison of them shows that the "alligator apple" of the Bahamas (*Annona glabra* L.) and the "water apple" of Jamaica (*Annona palustris* L.) are indistinguishable, a fact which was recognized by St. Hilaire, who, in company with Desfontaines, made a careful comparison of the two. In referring to the confusion of the two species St. Hilaire says: "*Annona glabra*, then, is still a species as little known as in the time of Linnæus. That immortal naturalist cites no other synonym of his species than the phrase and figure of Catesby, in whose work only a vague notion of the plant in question can be obtained. Lamarek, while copying Catesby, added to that author's description features borrowed from other species. As for Willdenow, he did nothing more than copy Linnæus, and contented himself with adding to the synonym from Catesby another synonym borrowed from DuRoi. Moreover, it is quite evident that he had not time to read the text of the Harbkesche Baumzucht; for its author states that he based his description of *Annona glabra* on a young plant sent from England under that name, but of which he saw neither the flowers nor the fruits; and as he adds that this young tree growing in a pot had *dentate* leaves, it is certain that the plant was not even an *Annona*. It is perfectly evident that if Willdenow had taken the trouble to read all the descriptions cited by him, he would never have reached the end of his first volume, and the impossibility which one finds of verifying so many obscure synonyms shows how necessary it is for botanists to free themselves from the obligation of citing them. To indicate them without investigation is but to multiply and perpetuate errors; to verify them is fruitlessly to spend time which would be more usefully employed in observing."

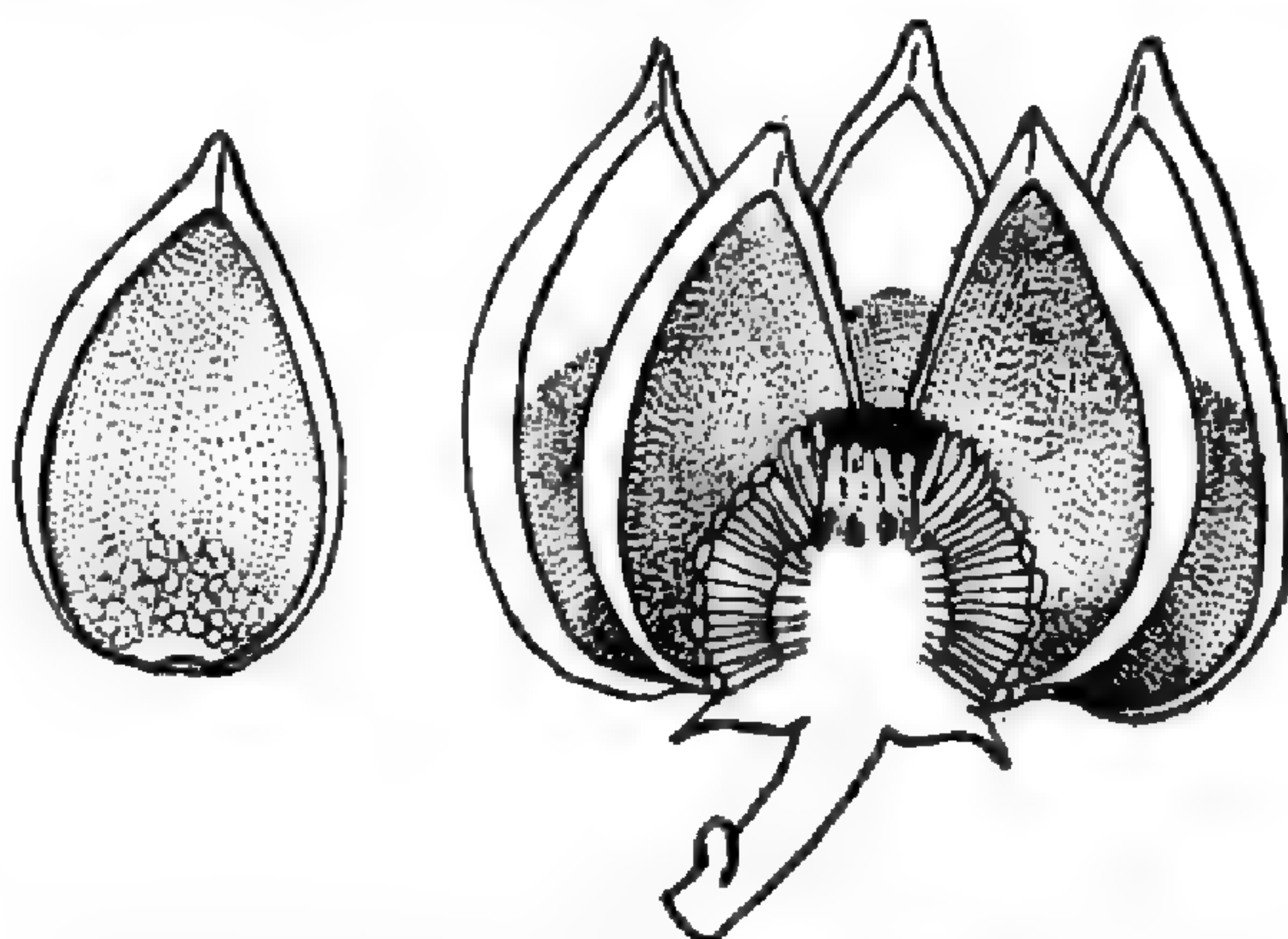


FIG. 19.—Flower of *Annona glabra*, showing valvate inner petals. One petal removed. Natural size.

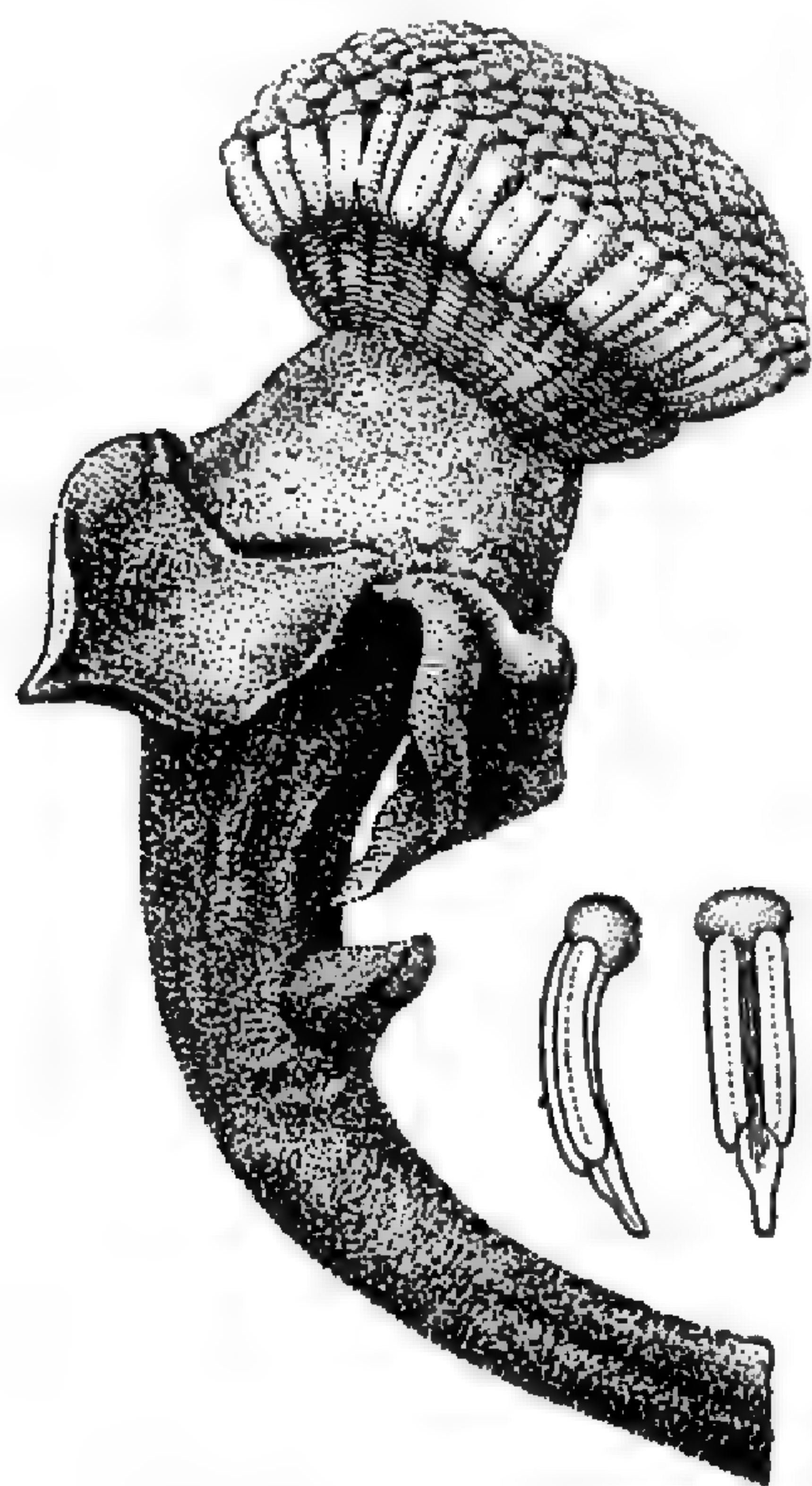


FIG. 20.—Gynoecium of *Annona glabra*, showing consolidated ovaries. Styles borne on the ovaries; two stamens at the side. Scale 4.

the synonym from Catesby another synonym borrowed from DuRoi. Moreover, it is quite evident that he had not time to read the text of the Harbkesche Baumzucht; for its author states that he based his description of *Annona glabra* on a young plant sent from England under that name, but of which he saw neither the flowers nor the fruits; and as he adds that this young tree growing in a pot had *dentate* leaves, it is certain that the plant was not even an *Annona*. It is perfectly evident that if Willdenow had taken the trouble to read all the descriptions cited by him, he would never have reached the end of his first volume, and the impossibility which one finds of verifying so many obscure synonyms shows how necessary it is for botanists to free themselves from the obligation of citing them. To indicate them without investigation is but to multiply and perpetuate errors; to verify them is fruitlessly to spend time which would be more usefully employed in observing."¹

Included in this section and closely allied to *Annona glabra*, if not identical with it, is *A. klainii* Pierre, of the west coast of Africa, abnormal 8-petaled flowers of which misled Pierre

as to its relationship to the typical *A. glabra*, which is found on the adjacent coast.

Section 8. ATRACTANTHUS sect. nov.

Type species, *Annona acutiflora* Mart. (pl. 22).

In this section the flower bud is acuminate. The outer petals are united at the base but open widely when the flower is mature (fig. 21). The inner petals

¹ St. Hilaire, Augustin de. *Plantes Usuelles des Brésiliens* 30: 5. 1824.

are acute and valvate and bear a keel or midrib on the back. The stamens terminate in a velvety, expanded connective tip and the hairy ovaries are grouped into a conoid gynœcium. The flowers are fascicled in extra-axillary or cauliflorous clusters of two or three, like those of the section *Chelonocarpus*,



FIG. 21. — *Annona acutiflora*.
Leaves and flowers. Natural size.

usually only 1 or 2 flowers of the cluster developing fruit. Fruit (immature specimens only observed) resembling that of *A. cherimola* (fig. 48, p. 41). The name of the section, which is included in Martius's *Acutiflorae*, is suggested by the more or less fusiform flower-bud.

Atractanthus seems to be intermediate between *Phelloxylon* and *Chelonocarpus*, resembling the former in its acute, valvate inner petals and the latter in its clustered peduncles.

GROUP IV. ATTAE (CUSTARD APPLES).

Section *Attæ* Mart., in part.)

Inner petals when present minute and scale-like, often not exceeding the stamens in length; outer petals linear or oblong, swollen and concave at the base, and usually keeled within or triquetrous above. This section includes the subsection *Oblongiflorae*, or *Cherimoliac*, of Martius, but excludes the *Pilaeiflorae*, described above.

KEY TO THE SECTIONS.

- Peduncles with amplexicaul leaflike bracts at the base; seeds with thick testa like the shell of a nut..... 11. *ILAMA* (p. 19).
- Peduncles without amplexicaul leaflike bracts at the base; testa of seeds thin.
- Leaves with thick conspicuous reticulating veins beneath between the lateral nerves..... 12. *SAXIGENA* (p. 20).
- Leaves with the veins not conspicuously reticulated beneath.
- Fruit thick-shelled when mature, with the areoles separated by raised ridges; pulp aromatic, mango-flavored, watery 9. *CHELONOCARPUS* (p. 18).
- Fruit thin-skinned when mature, with the areoles more or less gibbous. tuberculate or smooth, sometimes separated by impressed lines; pulp sweet or sweet-acidulous, sometimes insipid, custard-like..... 10. *ATTA* (p. 18).

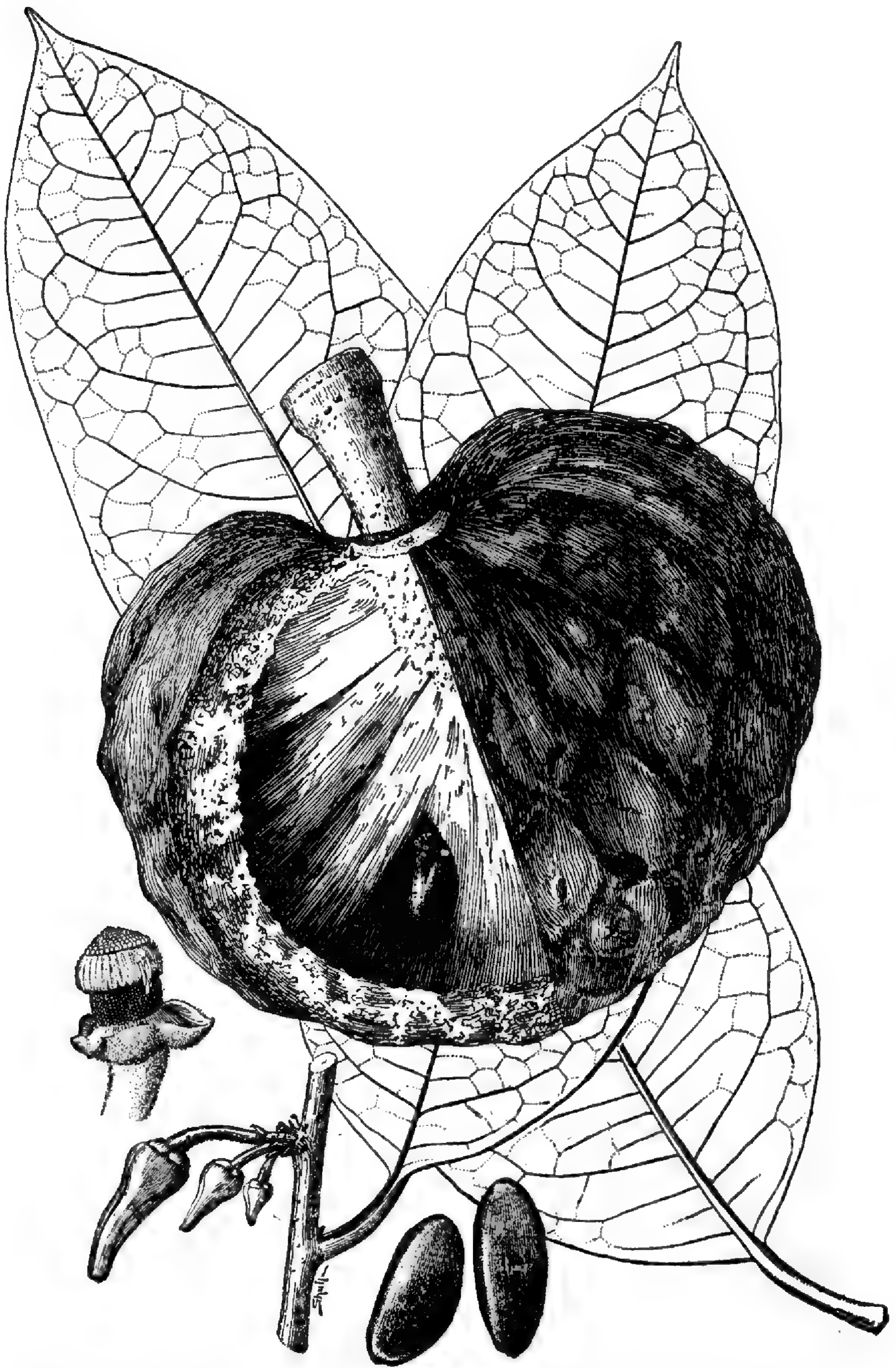


FIG. 22.—*Annona scleroderma*. Leaves, fruit, flower, and seeds. Flower enlarged, the rest natural size.

Section 9. CHELONOCARPUS Safford.¹

Type species, *Annona scleroderma* Safford, the hard-shelled custard apple of Guatemala (fig. 22).

In this section the inflorescence is usually caulifloral, several flowers issuing in a fascicle or on a very short specialized branchlet from the bark of the old

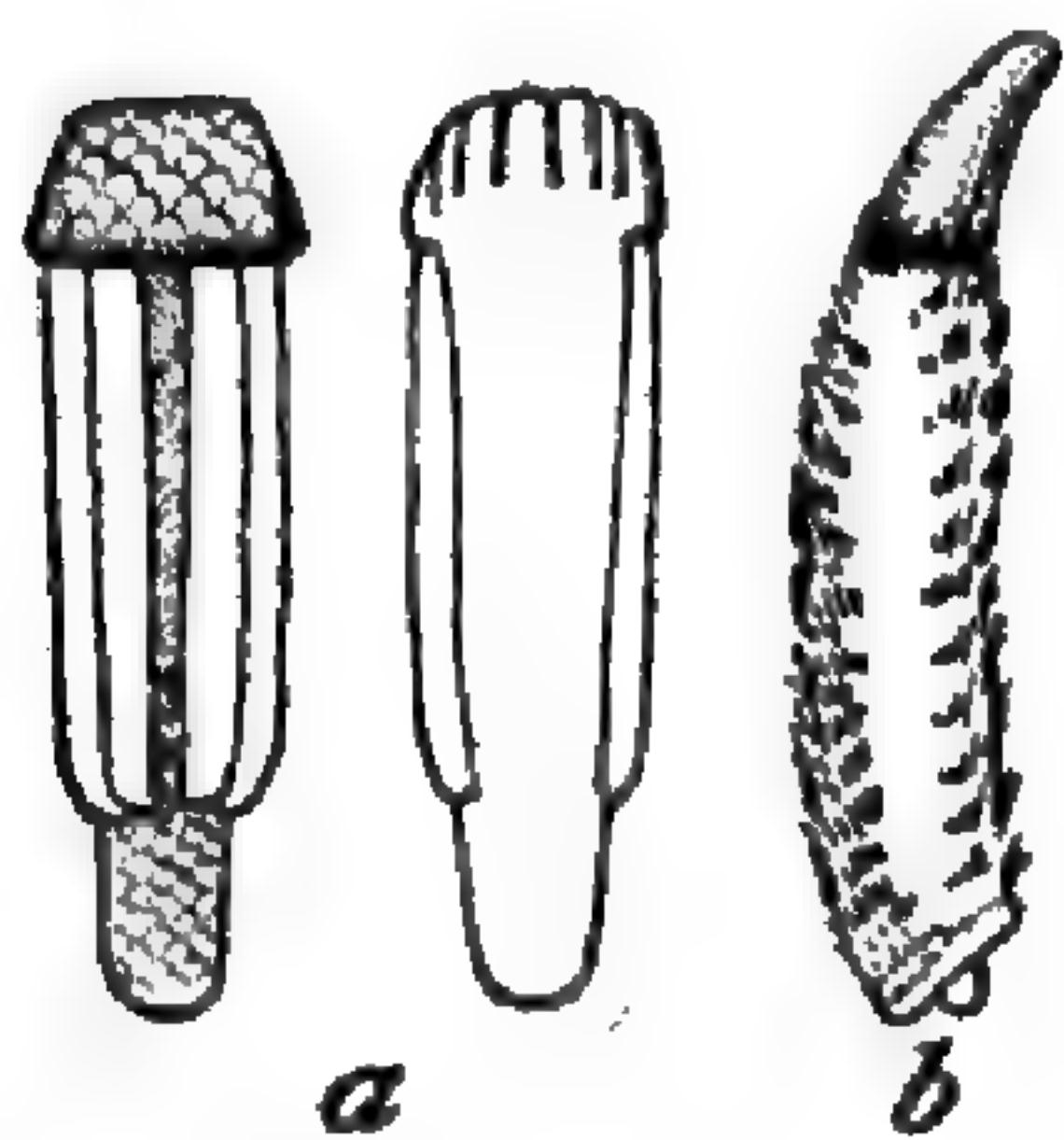


FIG. 23.—(a) Stamens and (b) carpel of *Annona scleroderma*. Scale 12.

stems or branches, somewhat as in the genus *Raimondia*, but all of them perfect instead of unisexual and with the connective broadly expanded and truncate at the apex above the pollen sacs (fig. 23, a) and the carpels closely appressed to form a compact gynœcium (fig. 24). The ovaries are clothed with appressed hairs and the styles are ovate and constricted at the base (fig. 23, b). The corolla resembles that of the section *Atta*, with three oblong or linear petals excavated at the base to receive the essential parts; or if inner petals are present these are very minute and inconspicuous.

The fruit is spherical or subglobose with a hard shell having the surface divided into polygonal areoles by obtuse raised ridges.

The seeds are comparatively large, compressed, and smoothly polished.



FIG. 25.—*Annona reticulata*, the common custard apple. Scale $\frac{1}{2}$.

usually 3 inner petals present, often no longer than a stamen, with a texture similar to that of the connective of the stamens and usually with a longitudinal



FIG. 24.—Flower of *Annona pittieri*. Petals removed. Scale 4.

of the shell of the fruit to tortoise shell. The leaves are coriaceous, oblong and acuminate, with the secondary nerves not prominent.

Besides the type, this section includes *Annona testudinea* Safford and *A. pittieri* Donn. Smith.

Section 10. ATTA Mart.

Type species, *Annona squamosa* L., the sugar apple or "pomme-cannelle" (fig. 1, p. 2).

This group includes most of the commercial custard apples. The flower buds are in most of the species long and slender, but sometimes oblong or pyriform. The corolla (fig. 26) is apparently 3-petaled, but there are

¹ Journ. Washington Acad. Sci. 3: 103. 1913.

keel on the outer surface. The outer petals are keeled within or triquetrous above and concave at the swollen base, to inclose the essential parts. The stamens terminate in a broadly expanded connective and the ovaries, except at the base, are distinct, though crowded, and form a compact cone with their tapering, appressed, fleshy styles. The leaves are usually membranaceous, with a tendency in several species to conduplication. The peduncles are in groups of 2 or 3 or sometimes solitary, usually issuing from near the base of a new branchlet and never caulifloral. The leaflike amplexicaul bracts at the base of the peduncles which characterize the following section (Ilama) are absent. This section includes, in addition to the type species, the well-

known chirimoya (*Annona cherimola* Mill.), the long-flowered chirimoya of Jalisco (*A. longiflora* S. Wats.), the common custard

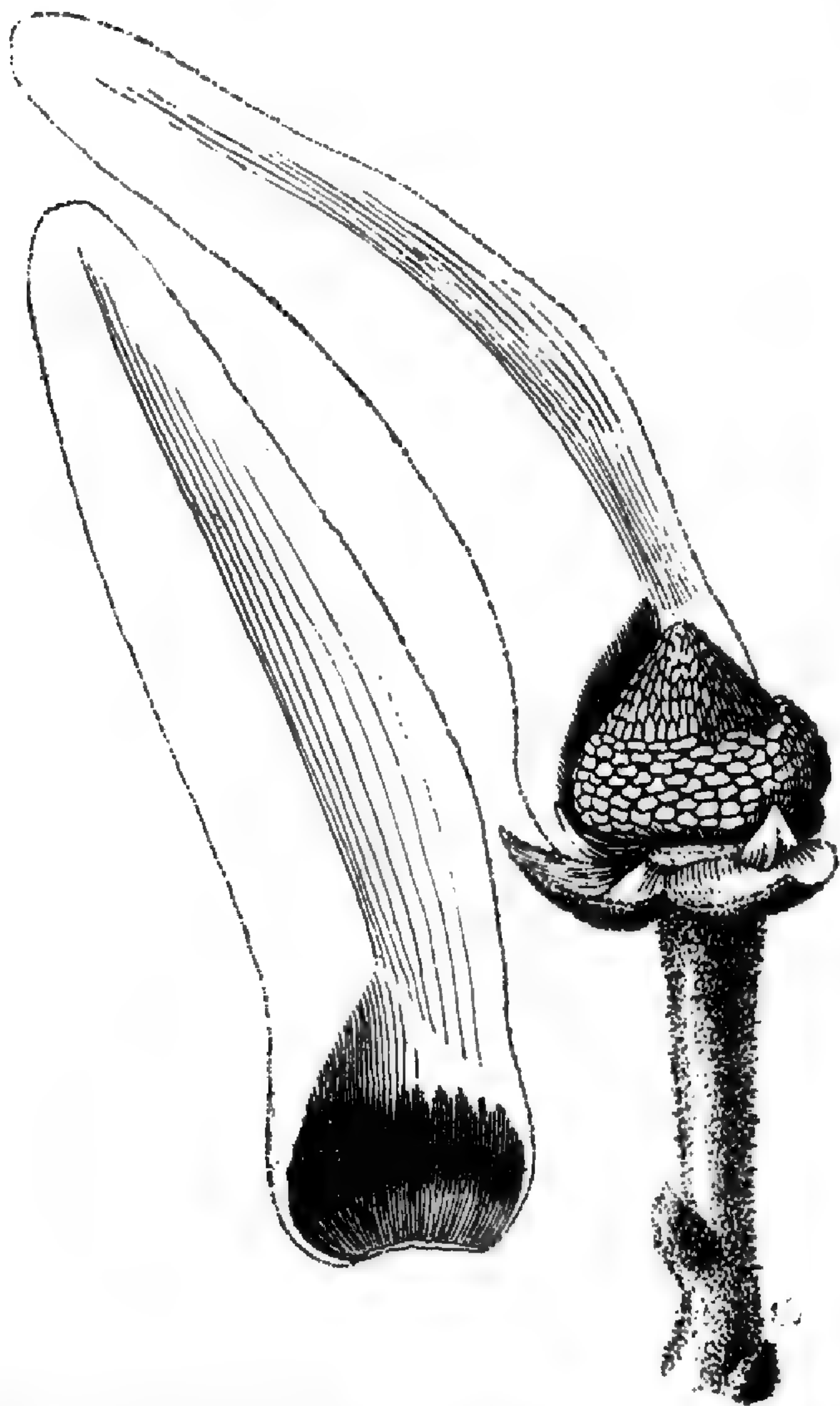


FIG. 26.—Flower of *Annona cherimola*. Showing essential parts and minute inner petal. Scale 4.

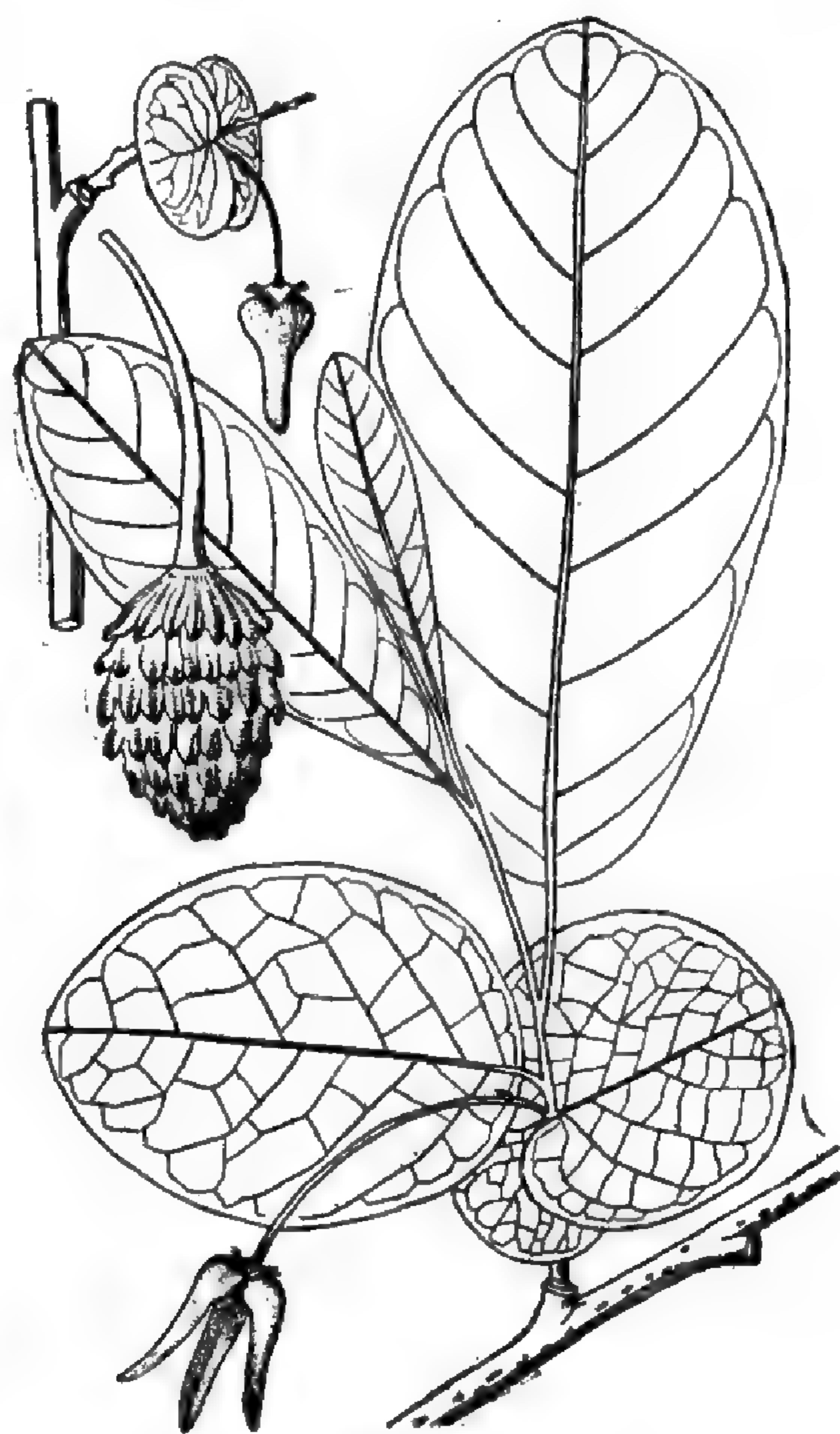


FIG. 27.—*Annona diversifolia*. Leaves, flower, and fruit. From type in U. S. National Herbarium. Scale $\frac{1}{2}$.

apple or bullock's heart (*A. reticulata* L., fig. 25), and two new species to be described below: *A. lutescens*, the "anona amarilla" of Central America (pl. 23; figs. 49-52, pp. 42, 43); *A. praetermissa* of Jamaica; and *A. palmeri*, the dwarf wild Annona of Acapulco (pl. 24; figs. 53, 54, pp. 44, 45).

Section 11. ILAMA Safford.

Type species, *Annona diversifolia* Safford,¹ commonly called "ilama" at Colima, Tlatlaya, and Acapulco (pl. 5; fig. 27).

¹ Journ. Washington Acad. Sci. 2: 118. 1912.

This group includes, in addition to the type, a single species, *Annona macrophyllata* Donn. Smith (pl. 26), to be redescribed below. It is chiefly distinguished from the other groups by the presence of

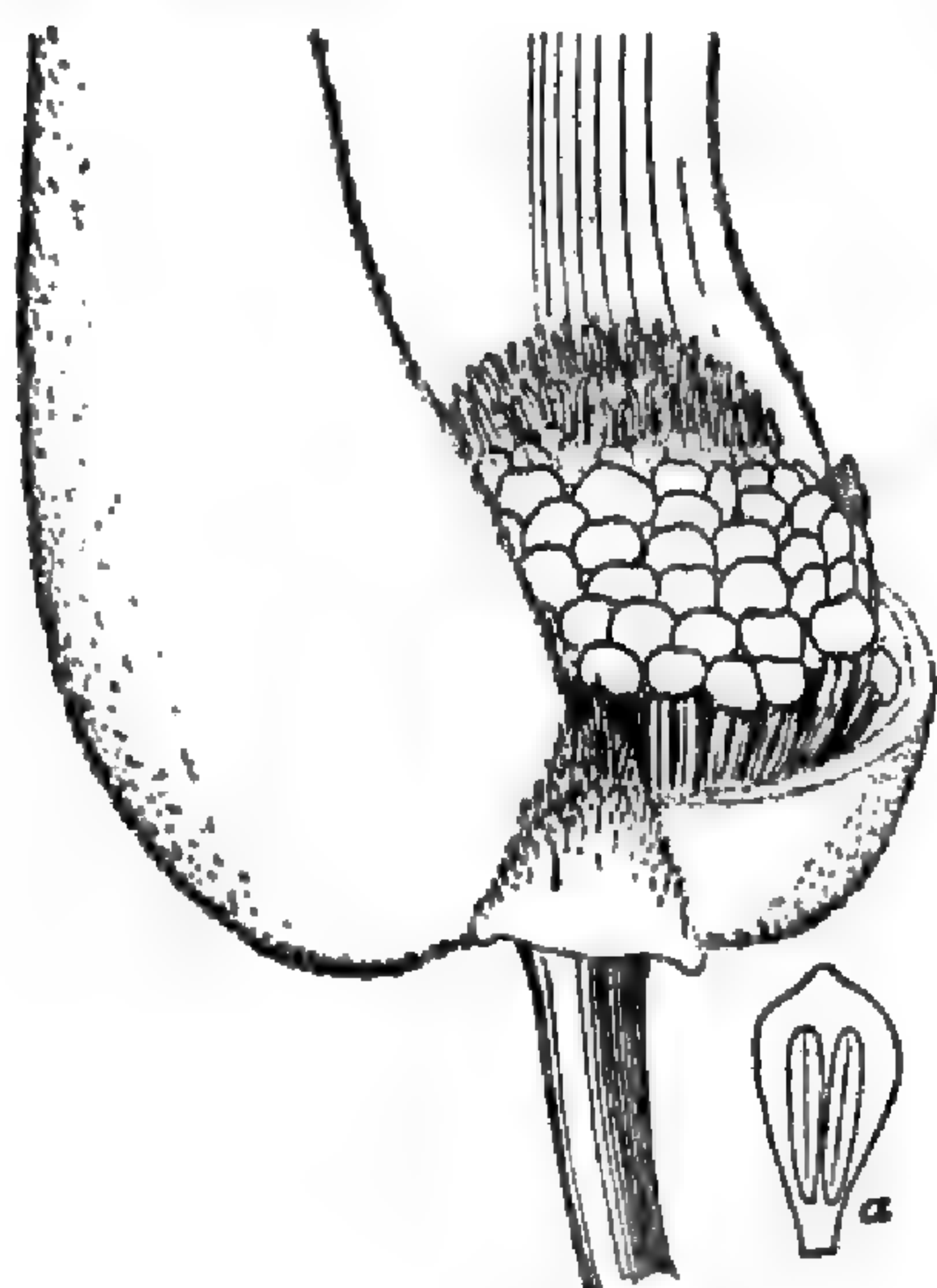


FIG. 28.—Flower of *Annona diversifolia*. Base of flower with an outer petal removed and (a) inner petal with rudimentary pollen sacs. From type specimen. Scale 4.

broadly ovate or orbicular, amplexicaul, leaflike bracts at the base of the peduncle and of flowering branchlets. In shape the flowers suggest those of the section *Atta*, but the petals open to the base and the inner petals when present are stamen-like and bear rudimentary pollen sacs (fig. 28). The fruit of the type species (pl. 5) is large, fleshy, and aromatic, with the juicy pulp frequently pink or rose-tinted. It is shaped "like a pineapple cheese" and is usually covered with large stout protuberances, though sometimes these are lacking in fruits of the same tree, as shown in the lower right-hand corner of plate 5. The seeds (fig. 29, a) differ

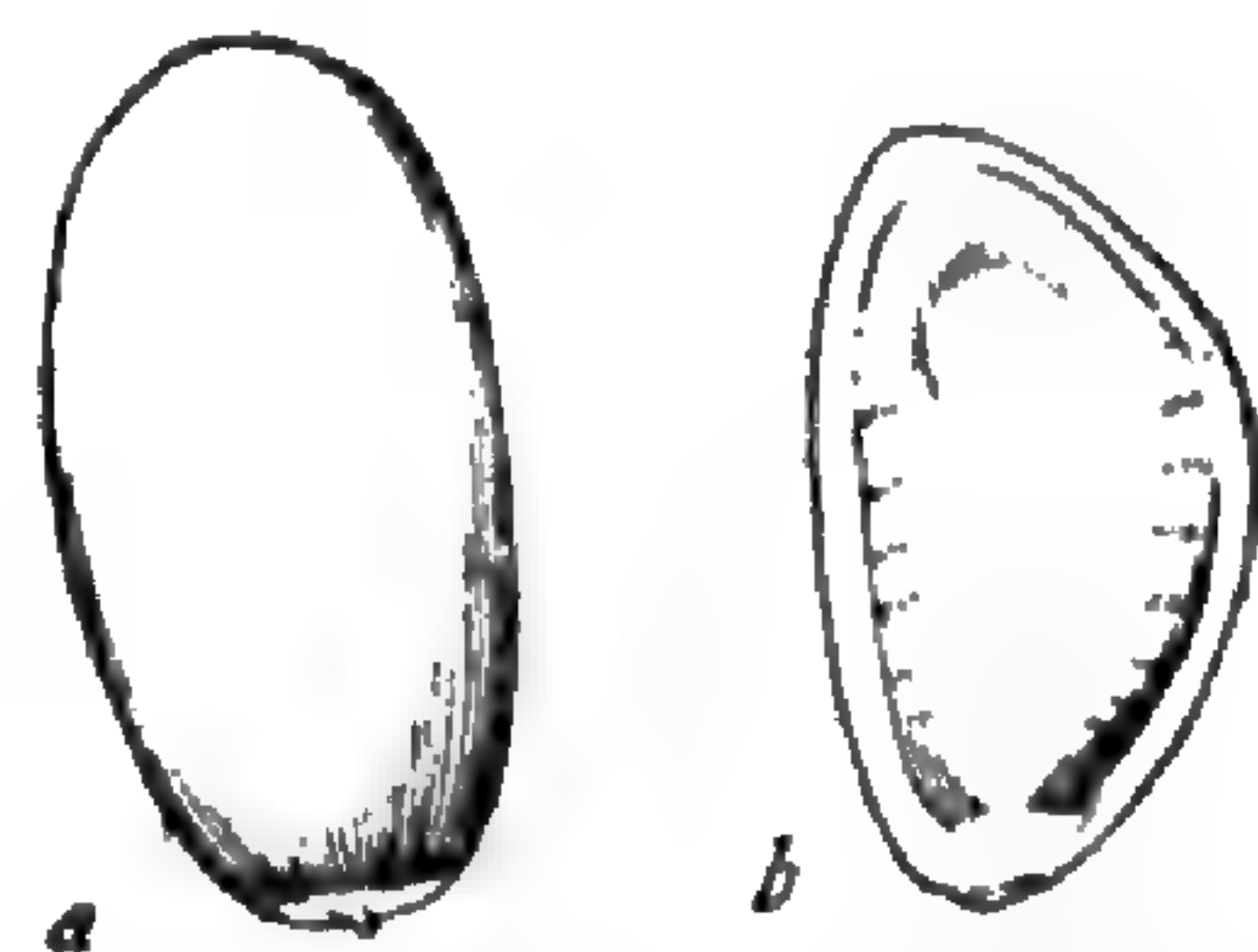


FIG. 29.—(a) Seed of *Annona diversifolia* and (b) one of *A. cherimola*. Natural size.

from those of all other *Annonas* known to the writer in having a hard, thick, smooth, terete testa, like the shell of a hazel nut.

Section 12. SAXIGENA sect. nov.

Type species, *Annona bullata* A. Rich. (pls. 27, 28).

The shrubs and small trees composing this section bear a general resemblance to those of the section *Atta*; but the leaves are remarkable for the close network of prominent veins between the lateral nerves (figs. 30, 31), and the stamens, instead of having the connective terminal broadly expanded into a hood above

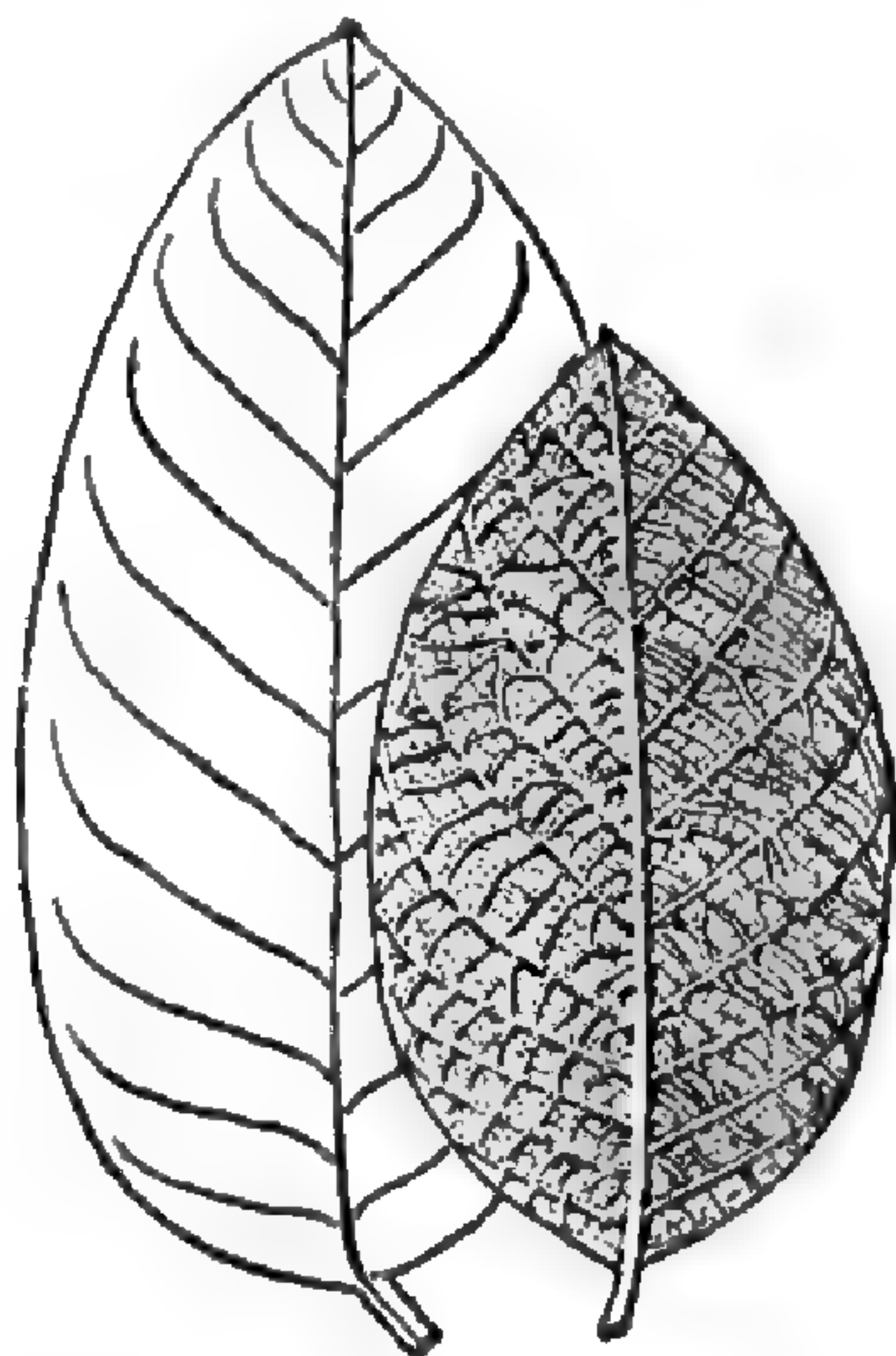


FIG. 30.—Leaves of *Annona bullata*. Scale $\frac{1}{2}$.

the pollen sacs, usually have it produced into a short, fleshy, obtuse tip scarcely equaling the breadth of the two pollen sacs, thus approaching those of the group *Annonellae*. In addition to the type species this section includes the closely allied *Annona crassivenia* (pls. 29, 30), the remarkably reticulated suborbicular leaf of which is shown in the

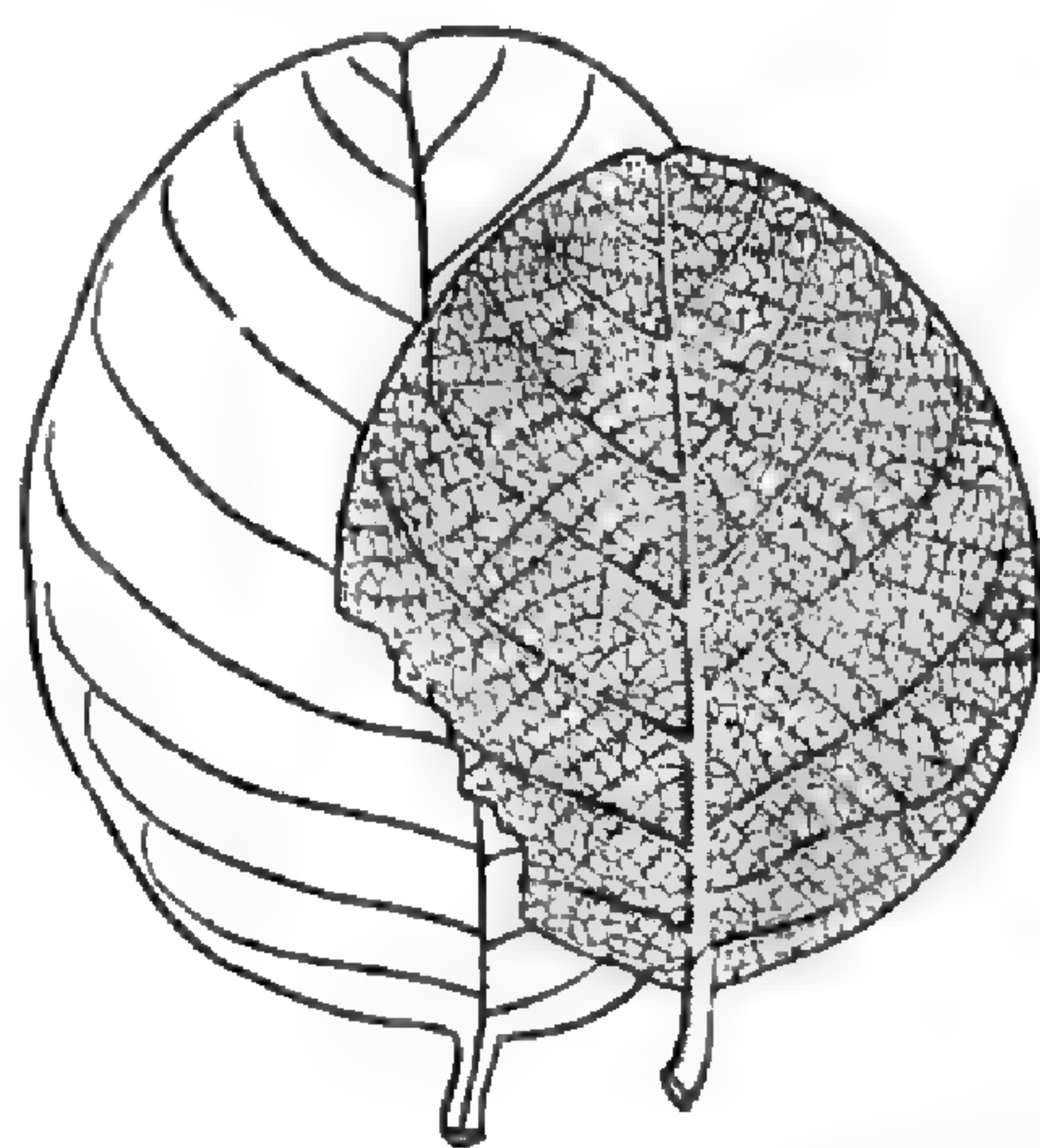


FIG. 31.—Leaves of *Annona crassivenia*. From specimens collected by Van Hermann as cited. Scale $\frac{1}{2}$.

accompanying illustration (fig. 31). The fruit (fig. 32) resembles that of a chirimoya in general appearance.

EXPLANATION OF PLATE 5.—Field photographs received through American consul, Marion Letcher, taken near Acapulco, State of Guerrero, Mexico. Scale of B indicated by Mexican peso.

The name applied to the section is suggested by the habitat of the type species, the plant being known in Cuba as the "laurel de cuabal"—i. e., laurel of rocky places.

GROUP V. ANNONELLAE (DWARF ANNONAS).

(Anonellae Baill.)

Flowers small, spheroid or conoid; petals 3 or 6, the outer ones thick and fleshy, the inner often rudimentary or entirely lacking; stamens remarkable for the comparatively small development of the apex of the connective, this not exceeding in width the two pollen sacs.

KEY TO THE SECTIONS.

Flower buds

pointed----- 13. ANNONULA (p. 21).

Flower buds

spheroid or
ovoid and

obtuse----- 14. ANNONELLA (p. 21).

Section 13. ANNONULA sect. nov.

Type species, *Annona cascarilloides*

Wright of western Cuba (pl. 31; figs. 60, 61, pp. 51, 52).

Flowers small, conoid or oblong-conoid; petals 3, triquetrous, hollowed at the base; apex of the

stamen-connectives not as broad as the two pollen sacs; leaves small, oblong-elliptical, coriaceous with revolute margins and with a thick midrib and lateral nerves almost at right angles with it. The venation of the leaves is very different from that of all other sections of the genus and the leaves and bark are characterized by a pungent aromatic taste like that of allspice.

In addition to the type species above mentioned this section includes *Annona sclerophylla* (pl. 32; figs. 33, 62, p. 53), a hitherto undescribed species from eastern Cuba. The name of this section, a diminutive form of *Annona*, is suggested by the dwarf, scrubby habit of the plants.

Section 14. ANNONELLA Baill.

Type species, *Annona globiflora* Schlecht. (pl. 35; figs. 34, 35, 63, p. 54).

Shrubs or small trees with comparatively small, punctulate, membranaceous or subcoriaceous leaves, reticulate-veined between the lateral nerves; flowers

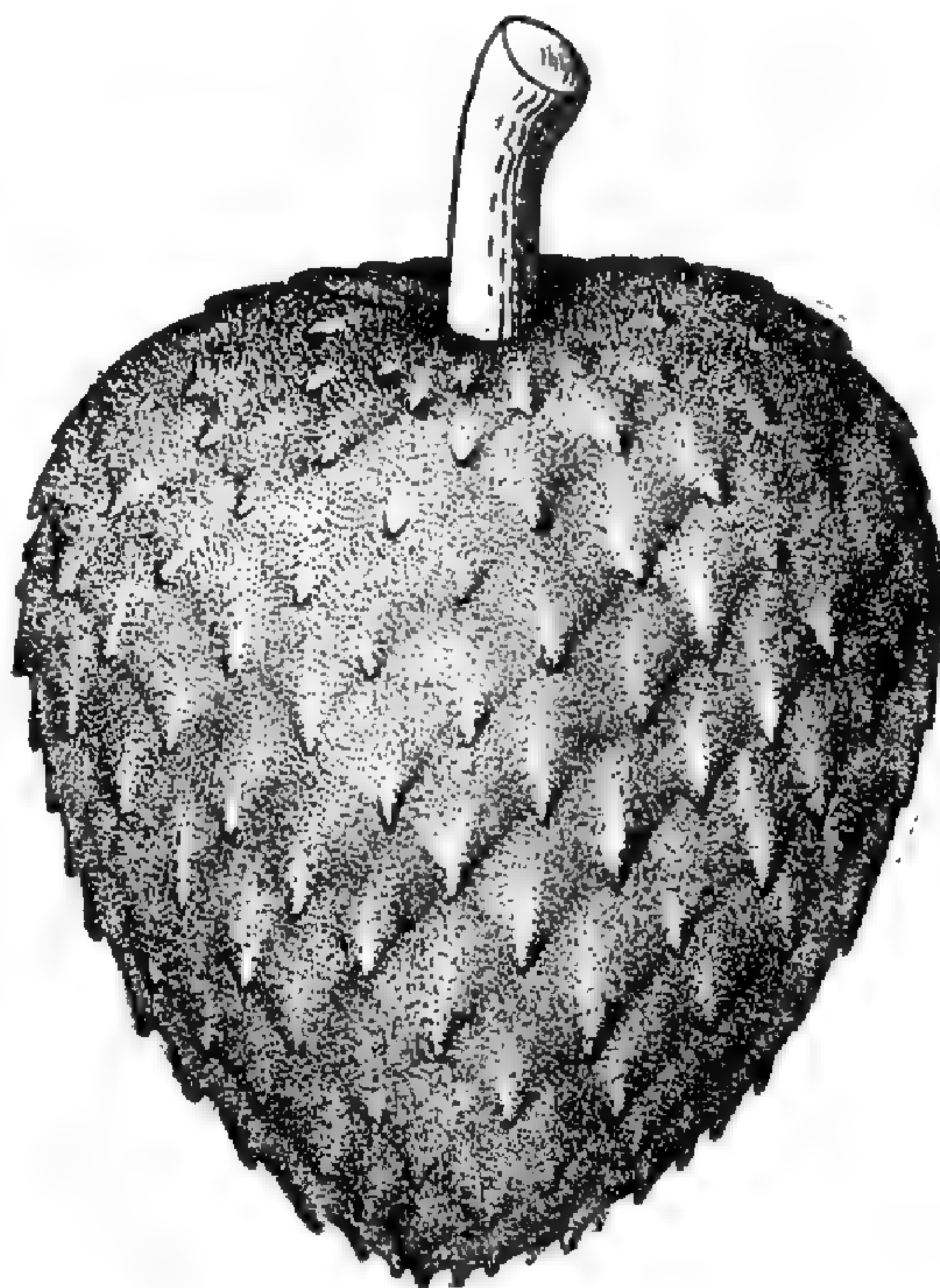


FIG. 32.—Fruit of *Annona bullata*. Natural size. Drawing by Theodore Bolton from type material.

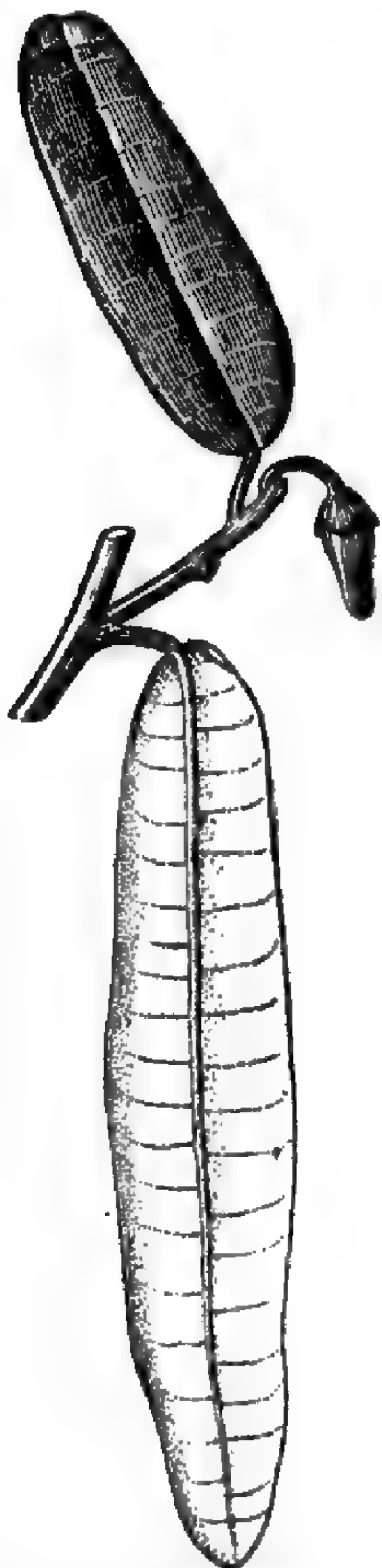


FIG. 33.—Leaves of *Annona sclerophylla*. Showing peculiar venation. From type specimen. Natural size.

(figs. 63, 64, pp. 54, 55) small, often no larger than a pea, on short slender peduncles, either solitary or geminate; petals 3 or 6, the outer ones thick, concave, broadly ovate or suborbicular; connectives of the stamens remarkable in not being broadly dilated above the pollen sacs; carpels free, the ovaries pilose and tipped with a tapering glabrous style; fruit (fig. 35) no larger than a peach with the areoles indistinctly outlined, gibbous and obtuse or terminating in a small point. The flowers are for the most part 3-petaled, but occasionally one or more inner petals are present. In addition to the type species this section includes *Annona bicolor* Urban (pl. 34), of Santo Domingo, the fruit of which is described and figured for the first time in the present paper, and *A. rosei* Safford (pl. 35), a new species which was recently discovered by Dr. J. N. Rose on the south coast of the island of Santo Domingo.

NEW AND IMPERFECTLY KNOWN SPECIES OF ANNONA.

Annona montana Macfad.

Annona montana Macfad. Fl. Jam. 7. 1837.

Section Euannonia. A tree usually of small dimensions, but sometimes reaching the height of 15 meters; leaves coriaceous, glabrous, dark green and very glossy as though varnished above, lighter green beneath, very similar to those of *Annona muricata* L., but larger, obovate-oblong, acute or rounded at the base and abruptly acuminate at the apex, usually about 12 to 18 cm. long and 5 to 6.5 cm. broad; flowers similar to those of *Annona muricata*, but with the 3 outer petals obtuse or acute, rarely acuminate, normally about 4 cm. long and 3 cm. broad, sometimes much larger (6 cm. long and 4 cm. broad), valvate, cordate-ovate, apparently glabrate on the outside but clothed with minute appressed hairs as seen under the microscope; inner petals imbricate, thin-edged, broadly obovate, usually rounded at the apex and narrowed at the base into a slender claw; calyx lobes triangular, acute, often persistent at the base of the fruit; peduncles thickest at the apex, glabrous, solitary or in pairs, extra-axillary, sometimes apparently axillary when issuing from the base of a new branchlet, often opposite a leaf, about twice the length of the petioles and bearing 2 small, sessile or semiamplexicaul, more or less persistent bractlets, these ovate or orbicular in shape and acute at the apex; receptacle truncate-conoid or subcylindrical, 5 to 6 mm. in diameter and 4.5 to 5 mm. high, thickly covered with minute straight hairs; stamens very numerous, in 18 to 20 rows, club-shaped, 4.3 to 5.5 mm. long, the two parallel pollen sacs 2.5 to 3 mm. long and the expanded connective above them 0.5 mm. thick and 1 mm. broad with its surface minutely muriculate; carpels forming a cluster (gynœcium) at the apex or center of the receptacle, 5 to 5.8 mm. high, the styles 3 mm. long covered with chestnut-colored sericeous hairs, the stigmas 2 to 2.8 mm. long, pale brown and velvety, broad at the end and tapering to the slender base, becoming glued together into a flat or convex surface by a viscous exudation just before the dehiscing of the pollen sacs and separating from the tips of the styles after pollination; fruit broadly ovate or subglobose, tomentose at first, at length glabrate, varying in size from that of

an orange to 15 cm. in diameter, with fleshy prickles shorter and straighter than those of the fruit of *A. muricata* protruding from the inconspicuous hexagonal, or U-shaped areoles; pulp white at first, turning yellowish when ripe; seeds yellow, light brown, or tan-colored, smooth and hard, enveloped when fresh in a white pellicle, ovate compressed, larger and lighter colored than those of *A. muricata*, about 20 mm. long, 13 mm. broad, and 7 mm. thick when mature and containing a hard white ruminant endosperm. (PLATES 6, 7.)

TYPE LOCALITY: Orchard, Port Royal Mountains, Jamaica.

DISTRIBUTION: West Indies and perhaps Central America and northern South America, usually growing along streams in the mountains but sometimes occurring near sea level.

SPECIMENS EXAMINED:

CUBA: Without definite locality, *Wright* 1847; near Camaguey, on banks of streams (seeds) *Luaces* 32248; Santa Clara, Trinidad Mountains, *Britton, Earle & Wilson* 4761.

HAYTI: Bayeux, near Port Margot, *Nash* 85 (1903).

SANTO DOMINGO: Woods near Iguama River, a tree 40 feet high, *Taylor* 313 (1909).

PORTO RICO: Coamo Springs, *Underwood & Griggs* 510, *Guy N. Collins*, photographs no. 2878, 2879, U. S. Dept. Agr., Bur. Plant Ind.; Coamo, Rio Fuerte Valley, *Sintenis* 3129, 6294; Peñuelas, on river bank, *Sintenis* 4840; near Mayagüez, flowers in formalin, U. S. Dept. Agr. Economic Coll. 3479.

GUADELOUPE: Without definite locality, along streams, "corossol bâlard," *Père Duss* 3984.

MARTINIQUE: Lezard, banks of stream, *Père Duss* 1764a; without definite locality, *Hahn* 188, 1018 (distributed as *A. palustris*).

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FIG. 34.—*Annona globiflora*. Leaves, flowers, and fruit. Scale $\frac{1}{2}$.

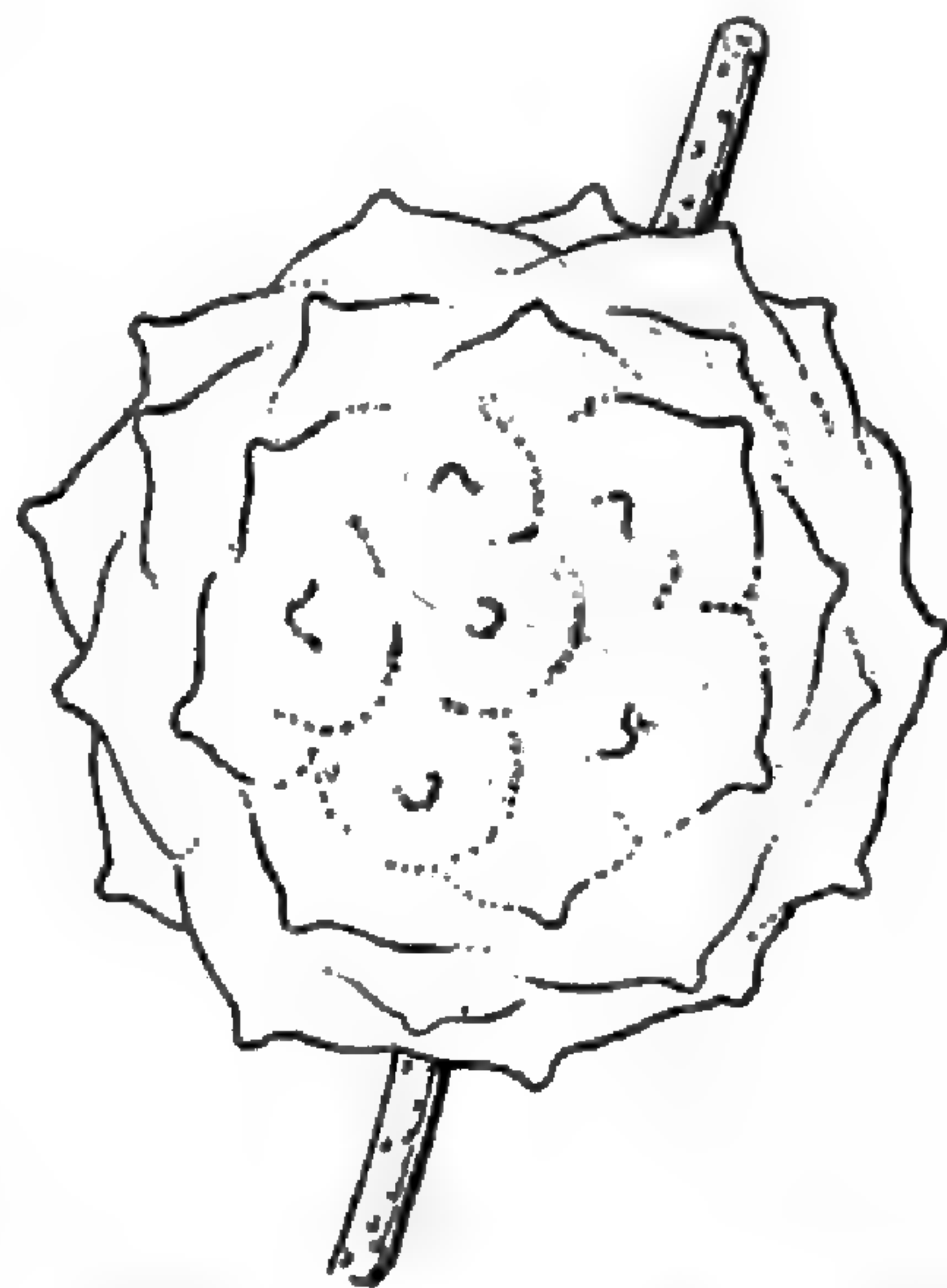


FIG. 35.—Fruit of *Annona globiflora*. Natural size.

SPECIMENS EXAMINED—Continued.

JAMAICA: Hope River Valley, *Wm. Harris* 9979; between Hope Gardens and Constant Springs, *Maxon* 2152, *Guy N. Collins*, photographs 6814, 6758, U. S. Dept. Agr., Bur. Plant Ind.

AFRICA: Experimental Garden, Kamerun, Versuchsanstalt, nos. 274, 281.

LOCAL NAMES: Prickly apple, Mountain soursop, Wild soursop (Jamaica); Guanabano cimarron (Cuba, Santo Domingo, Porto Rico); Corossolier maron (Haiti, Guadeloupe); Corossolier bâtard (Martinique).

This species is frequently confused with *Annona glabra* L. and has been repeatedly distributed as the latter species. It can readily be distinguished, however, by its imbricate inner petals or by the small pits in the axils of the lateral nerves of its leaves above described.

EXPLANATION OF PLATES 6, 7.—Pl. 6, unusually large flowers of *Annona montana*, the lower one with two outer petals and one inner petal removed to show the hemispherical andrœcium, from the center of which issues the gynœcium. From photograph of specimens in formalin from Mayagüez, Porto Rico, received by the Bureau of Plant Industry, May 12, 1910, made under the author's direction by L. V. Hallock, of the U. S. Department of Agriculture. Pl. 7, *Annona montana* Macfad., showing leaves with the minute pockets in the axils of the lateral nerves and immature fruit. From field photograph of fruit growing at Coamo Springs in files of the Bureau of Plant Industry, taken by Mr. Guy N. Collins, June 29, 1901 (no. 2878).

Annona sphaerocarpa Splitg.

Anona sphaerocarpa Splitg. Tijdsch. Nat. Gesch. 9: 96. 1842.

Section Euannona. A tree of moderate height with a thick trunk and the habit of *Annona muricata*; woody branches gray, speckled with whitish lentils; leaves oblong-lanceolate to oblong-obovate, glabrous, coriaceous, acutish, very finely reticulate-veined, glossy above, 12 to 20 cm. long, 5 to 10 cm. broad, with a petiole 6 to 10 mm. long, grooved above, thick; peduncles solitary or in pairs, 1-flowered, 2.5 cm. long, thickened at the extremity, glabrous, with a broad ovate obtuse bracteole above the base and sometimes one near the middle; calyx lobes broad, obtuse, appressed to the corolla, reflexed after blooming; petals thick, yellow, the outer almost an inch long, ovate, concave, acutish, the inner ones shorter, concave, obovate, quite obtuse, narrowed abruptly into a subtriquetrous claw; stamens numerous, the apex of the connective capitate and velvety; torus pubescent; carpels concrete at the base, clustered into a conoid gynœcium; fruit large, spherical, yellowish when mature, 10 to 12.5 cm. in diameter, obscurely areolate, not scaly, the areoles unarmed or bearing small short straight protuberances easily rubbed off in handling; seeds ovate, compressed, yellowish, about 18 mm. long, with the embryo in the base of the albumen. (PLATE 8, B. FIGURE 36.)

Type in the Leyden Herbarium, collected by Friedrich Ludwig Splitgerber near Paramaribo, Surinam, November, 1837 (no. 110).

DISTRIBUTION: Surinam (Dutch Guiana); Panama (cultivated in hospital grounds at Ancon).

SPECIMENS EXAMINED:

SURINAM: Vicinity of Paramaribo, *Kuyper*, September 29, 1912, with photograph of fruit (U. S. Nat. Herb., nos. 691787, 691788).

SPECIMENS EXAMINED—Continued.

PANAMA: Hospital grounds at Ancon, February 13, 1911, *Pittier* 2724 (U. S. Nat. Herb., no. 676859).

BRAZIL: Without definite locality, *Sellow* 1209 (Berlin Herb.).

LOCAL NAMES: Bosch-zuurzak, "Wild soursop" (Surinam).

From this species *Annona muricata* L. differs in its cordate, acuminate outer petals and in its fruits. The close relationship between *Annona sphaerocarpa* and *A. montana* is apparent from the accompanying illustrations. One of the chief differences between the two species is the greater size of the leaves of *A. sphaerocarpa*. *Pittier's* no. 2724, collected in the hospital grounds at Ancon, on the Isthmus of Panama, is here referred to this species. The protuberances on the fruit are smaller than those on the fruit of *A. montana* and in some cases are nearly absent. Should the two species prove to be identical the name *Annona montana* Macfad., being the earlier, must prevail. If *A. sphaerocarpa* should prove to be identical with *A. marcgravii* Mart., and distinct from *A. montana*, it must take the former name, which was given one year previously. The three species are undoubtedly closely related.

EXPLANATION OF PLATE 8.—A, immature fruit of *Annona montana*, from photograph made at Coamo Springs, Porto Rico, June 29, 1901, by G. N. Collins (no. 2879). B, fruit of *A. sphaerocarpa*, from photograph made in Paramaribo, September 29, 1912, by Dr. J. Kuyper.

Annona marcgravii Mart.

Annona marcgravii Mart. Fl. Bras. 13¹: 5. 1841.

Annona muricata Vell. Fl. Flum. 239. 1825.

Atlas 5: pl. 126. 1827, not L. Sp. Pl. 536. 1753.

Section Euannona. A tree of moderate size, the ascending branches forming a dense oblong crown; bark grayish white, smooth, or lightly furrowed; branchlets glabrous, pale brown, bearing numerous inconspicuous pale brown lenticels; leaves usually obovate-oblong and acute at the base, sometimes subelliptical and rounded at the base, coriaceous at length, above deep green and very glossy, as if varnished, paler beneath, 8 to 25 cm. long by 4 to 9.5 cm. broad, shortly and usually obtusely acuminate; petiole 4 to 10 mm. long, terete and grooved above; midrib prominent beneath; lateral nerves (about 10 on each side) slightly curved and connected by a network of anastomosing veins; peduncles solitary or geminate, if the latter, usually one only persisting and bearing fruit, glabrous, 12 to 25 mm. long, with a small broad semiamplexicaul acutish bracteole

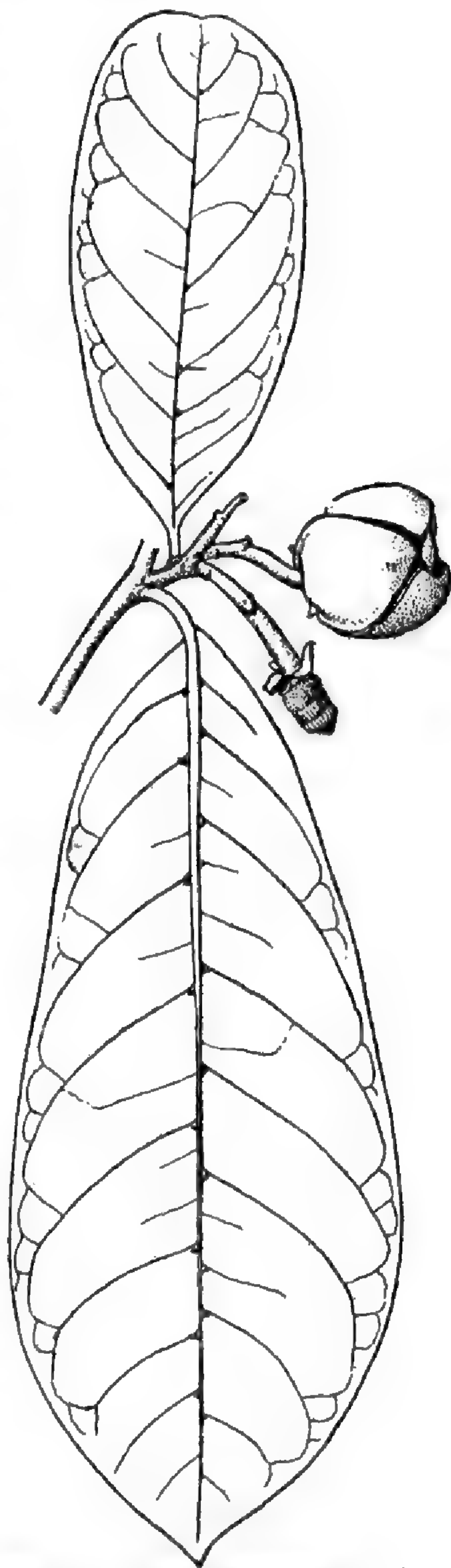


FIG. 36.—Leaves and flower of *Annona sphaerocarpa*. Scale $\frac{1}{2}$.

about the middle and usually one at the base; flowers large, borne on branches; outer petals erect, broadly cordate-ovate, acute or acutish, more than 25 mm. long, thick, valvate, greenish white or pale yellow, clothed on the outside with minute silky white hairs (visible under the microscope); inner petals about half as large as and thinner than the outer, connivent over the essential parts, imbricate; torus densely rufous-villous; stamens closely crowded, the swollen terminal heads of the connectives minutely muriculate like those of *A. muricata*; carpels distinct, with the linear pistils clothed with appressed pale rufous sericeous hairs; fruit ovate-globose, conoid (turbinate), ovoid-oblong, or spheroid, tomentose at first, at length glabrate, muricate with fleshy prickles very much as in *Annona muricata*, but these smaller and sometimes almost wanting or at length broken off, green at first but usually brownish at length; pulp when immature white, at length yellowish and soft, with the odor of fermenting dough and with an unpleasant taste; seeds yellow or light tan color to chestnut, smooth and glossy, obovate-oblong, compressed, marginate, 12 to 24 mm. long, by 8 to 12 mm. broad, enveloped when fresh in a thin white membrane. (PLATES 9, 10.)

This species was based by Martius upon the descriptions of Piso and Marcgrave of the Brazilian "araticú ponhê."¹

DISTRIBUTION: Brazil, Province of Minas, near Bahia and Pernambuco, to French and Dutch Guiana and Venezuela.

SPECIMENS EXAMINED:

BRAZIL: Bahia, "in sabulosis maritimis, an sponte ? Arbor 10 pedalis, trunci diameter pedalis," 1830, *Salzmann* 5 (Herb. De Candolle); without definite locality *Sellow* (Berlin Herb. 6).

VENEZUELA: Sacupana, lower Orinoco River, April, 1896, *Rusby & Squires* 100 (U. S. Nat. Herb. no. 325549; Herb. Phila. Acad. Sci.); near Carácas, March, 1913, *Pittier* 5855 (with photographs of leaves, unopened flower, and fruit).

LOCAL NAMES: Araticú ponhê (Brazil); Guanábana cimarrona (Venezuela); Corossol sauvage (French Guiana).

The "araticú ponhê" of Brazil was first described in 1648 by Piso and Marcgrave, together with the "araticú apé," which differs from it in having dark-colored instead of yellow seeds. The resemblances of both these species to the "guanábana," or soursop (*Annona muricata* L.), was pointed out; but these authors were apparently unfamiliar with the latter species, described under the name "guanabanus" by Oviedo, whose description they repeat at length. The *araticú apé* was supposed to be identical with Oviedo's "guanabanus," by Plukenet, who published an accurate figure of its leaves.² Martius, however, bases a distinct species upon it, which he calls *Anona pisonis*, in honor of Piso, though he never saw a specimen of the plant nor of its fruit. Martius also erroneously refers to the *A. muricata* of Linnæus the *A. muricata* of Velloso, which was undoubtedly the *araticú ponhê*, or wild soursop, as is shown by the conspicuous pits in the axils of the lateral nerves of the leaves.³ These exist in the leaves of the cultivated soursop (*A. muricata* L.), but are so minute as to be almost imperceptible to the naked eye.

Upon the *araticú ponhê*, as described by Piso and Marcgrave, Martius bases his *Anona marcgravii*, which is so closely allied to the wild soursop of the West Indian Islands (*A. montana* Macfad.) that it may, perhaps, be regarded as a form of that species. If the two prove to be specifically identical, the name

¹ Piso, Med. Bras. 69. 1648. Marcgr. Hist. Nat. Bras. in Piso, Med. Bras. 93. (fig.) 1648.

² Pluk. Phytogr. 4: pl. 134. f. 2. 1769.

³ Vell. Fl. Flum. 5: pl. 126. 1827.

A. montana Macfad. must stand, according to the rules of priority. The following description of the *araticú ponhê*, upon which Martius bases his *Anona marcgravii*, applies almost equally as well to the wild soursop of Jamaica and Porto Rico. The chief difference seems to be in the greater size of the leaves of the South American tree.

"A tree with the trunk, form of the branches, and color of the bark resembling those of an orange, but with different leaves, flowers, and fruit. Its leaves are about $\frac{1}{2}$ foot long, alternate, above deep green and glossy, beneath pale green, thick, solid to the touch, scarcely 2 digits broad, shaped like the human tongue, and acuminate at the apex. The flower is large and conspicuous, exceeding the flower of a *Fritillaria*, entirely yellow, with 3 outer cordiform petals $1\frac{1}{2}$ digits long, thick as orange peel and standing erect. These contain within them 3 other smaller petals half as thick, overlapping in such a way as to form a sort of hollow globe as large as a walnut. The stamen [androecium] is round and yellow, as large as a hazelnut with a small rounded apex [gynœcium]; both the stamen and the apex are furnished with tiny tubercles [the stamen connectives and stigmas] which resemble the pores in the flesh of a man when chilled [goose flesh.]

"The flower, as I have said, is entirely yellow, with a sweet but sickening odor. It blossoms principally in the months of September, October, and November. The flower is deciduous; for many open day by day, and after a few hours fall of their own accord, making a noise in dropping, as though the tree had been struck by somebody with a stick, for the flower is heavy and large. The flower is followed by a fruit which ripens chiefly in December and January.

"It cannot be eaten, however, unless it drops off of its own accord, for then it is soft like pap. It is of a turbinate shape [conoid] 4 or 5 digits long, and 7 or 8 digits in circumference where the peduncle is attached. On the outside the color is green and white mixed, or uniform pale green, and it looks as if the skin were composed of scales, for it is marked by green lines into pale greenish areoles [squamæ], each areole having a small tubercle in the middle, brown, so that it looks like a pine cone. When it falls it is soft so that it can be peeled with the fingers like old putrid cheese. It contains a yellowish flesh or pulp composed of pyramidal segments, intermixed with fibrous particles and many kernels or seeds. The odor of the pulp may not unfittingly be compared to fermenting bread dough, to which some honey has been added. The taste is sweetish subacid and somewhat bitter, unpleasant to me, but with an agreeable odor. At the place where the peduncle is inserted the fruit contains within it a lump of harder flesh shaped like a suppository which can be pulled out. This is eaten and is offered at the table as a most choice tidbit. The seeds of the fruit are oval in shape, the size of a faba, smooth and hard, of a golden yellow color and glossy, inclosed when fresh in a kind of white pellicle. The inside kernel is composed of a white hard substance with a taste not unlike that of the root of *Helenium*, or bitterish sweet."

The fruit of this species varies considerably in the development of the prickles on the surface and in its general form, which, in the original description of Marcgrave, is called turbinate, but which in the accompanying figure is ovate-oblong and by Martius is described as globose-ovate with the protuberances on the subrhomboid areoles at length obliterated. Its very close affinity to *A. montana* Macfad. and *A. sphaerocarpa* Splitg. has already been mentioned.

Considerable variation in the form of the leaf occurs, and the writer was at first inclined to separate those specimens in which the leaf blades were rounded

at the base and subelliptical in outline from those in which they were sharp at the base and obovate-oblong in form; but further study showed both forms of leaves to be occasionally found in the same specimen, so that no such specific or varietal distinction could be made. In all leaves, however, the peculiar pits in the axils of the lateral veins of the leaves occur, though in some cases they are scarcely visible without the aid of a lens. It is this peculiarity chiefly which sets apart all the true soursops (section *Euannonia*) from other groups of the genus. Another peculiarity which wild soursops possess in common is the very glossy upper surface of the leaves, which appear to have a coating of varnish. This feature does not occur in the cultivated soursop (*A. muricata*) which, moreover, often has caulifloral flowers and has the well-known large, juicy, sweet-acidulous fruits, while the fruits of wild soursops can scarcely be called edible, and their flowers are never caulifloral.

EXPLANATION OF PLATES 9, 10.—Pl. 9, photograph of leaves and unopened flower, together with young fruit. Taken in the field in the Bosque de Catoche, near Caracas, Venezuela, February 22, 1913, by H. Pittier. Pl. 10, photograph of fruit, same source. Both natural size.

Annona salzmanni A. DC.

Annona salzmanni A. DC. Mém. Soc. Phys. Hist. Nat. Genève 5: 197. 1832.

Section *Psammogenia*. A tree of medium height with a much branching crown and a thick trunk; branches rather glabrous, bearing numerous prominent light-brown or whitish lenticels, clothed when young with minute appressed ferrugineous hairs; bud scales densely ferrugineous-pilose; leaf blades obovate to oblong or obcordate, rounded or retuse at the apex and rounded or obtusely cuneate at the base with the blade abruptly decurrent on the petiole, 5 to 10 cm. long and 3.5 to 6 cm. broad, coriaceous, glabrous or nearly so when mature, but with sparse fine straight whitish appressed hairs along the midrib and veins beneath, visible under the microscope; upper surface pale olive green (in dry specimens), with the midrib, nerves, and veins impressed, the latter inconspicuous; lower surface rufous or tan-colored, with the midrib prominent; lateral nerves (10 to 12 on each side), impressed, inconspicuous, connected by impressed reticulating veins; parenchyma (of thick adult leaves) not pellucid-punctate; margin entire, more or less revolute; petiole short, thick and swollen, 5 to 7 mm. long, broadly grooved above, clothed with appressed sericeous hairs at first, at length glabrate; peduncles in pairs or solitary, extra-axillary, sometimes apparently axillary when situated a short distance above a leaf axil, often opposite a leaf as in many other Annonaceae, clothed with fine short appressed ferrugineous hairs, 1-flowered, 12 to 20 mm. long, thickest at the apex, erect, with 1 to 3 ovate acute ferrugineous-hirtellous bracts at the base; calyx gamosepalous, 3-lobed, broadly cup-shaped, 2 cm. wide, clothed on the outside with appressed ferrugineous hairs like those of the peduncle, the lobes rounded or triangular, thick, obtuse at the apex, 8 to 9 mm. long and equally broad at the base; flower buds ovoid or subpyramidal and subtriangular in cross section, acutish or rounded at the apex, rufous-sericeous; petals thick, ovate, acute or acutish, the outer ones valvate, 25 to 29 mm. long and 18 mm. broad, rufous-sericeous on the outside and lined within with fine brown tomentum; inner petals smaller, narrowed or clawed at the base, 2 to 2.5 cm. long and 1 to 1.2 cm. broad, ovoid or subrhomboid, not overlapping or imbricate, acute or acutish, clothed on both surfaces with fine brown tomentum; stamens numerous, soon falling off, 4 mm. long, the connective expanded or capitate above the parallel linear pollen sacs, its surface minutely verrucose or muriculate with glossy points; torus convex or conoid-truncate, its surface densely clothed with minute

short pale rufous hairs; carpels forming a dense cluster (gynœcium) at the apex of the conoid torus, the ovaries linear, distinct, 2 to 2.7 mm. long, clothed with appressed ferrugineous silky hairs; styles articulate, falling off after pollination; fruit not observed. (PLATE 11. FIGURES 38, 39.)

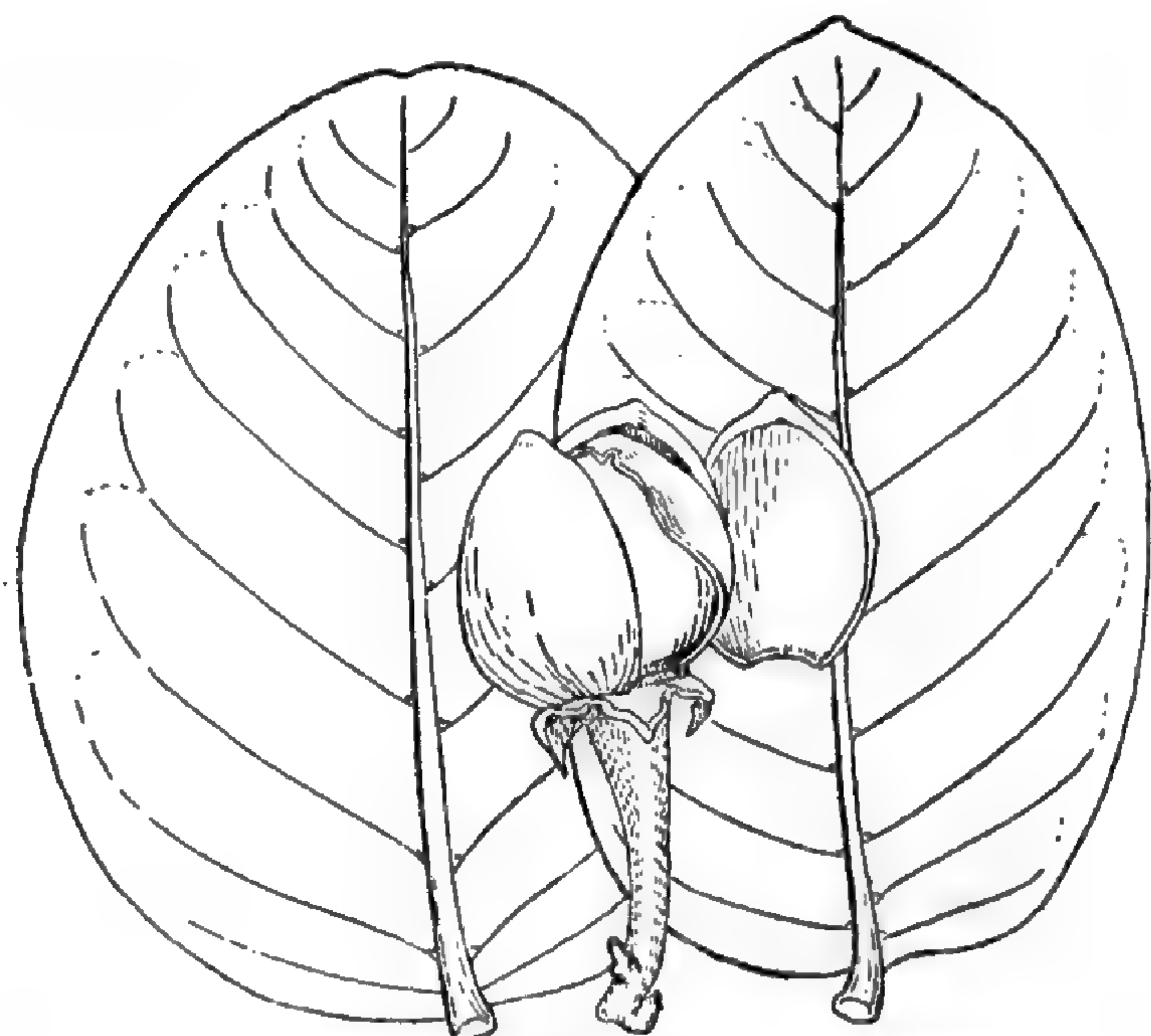


FIG. 37.—Leaves and flower of *Annona coriacea*.
Scale $\frac{1}{2}$.

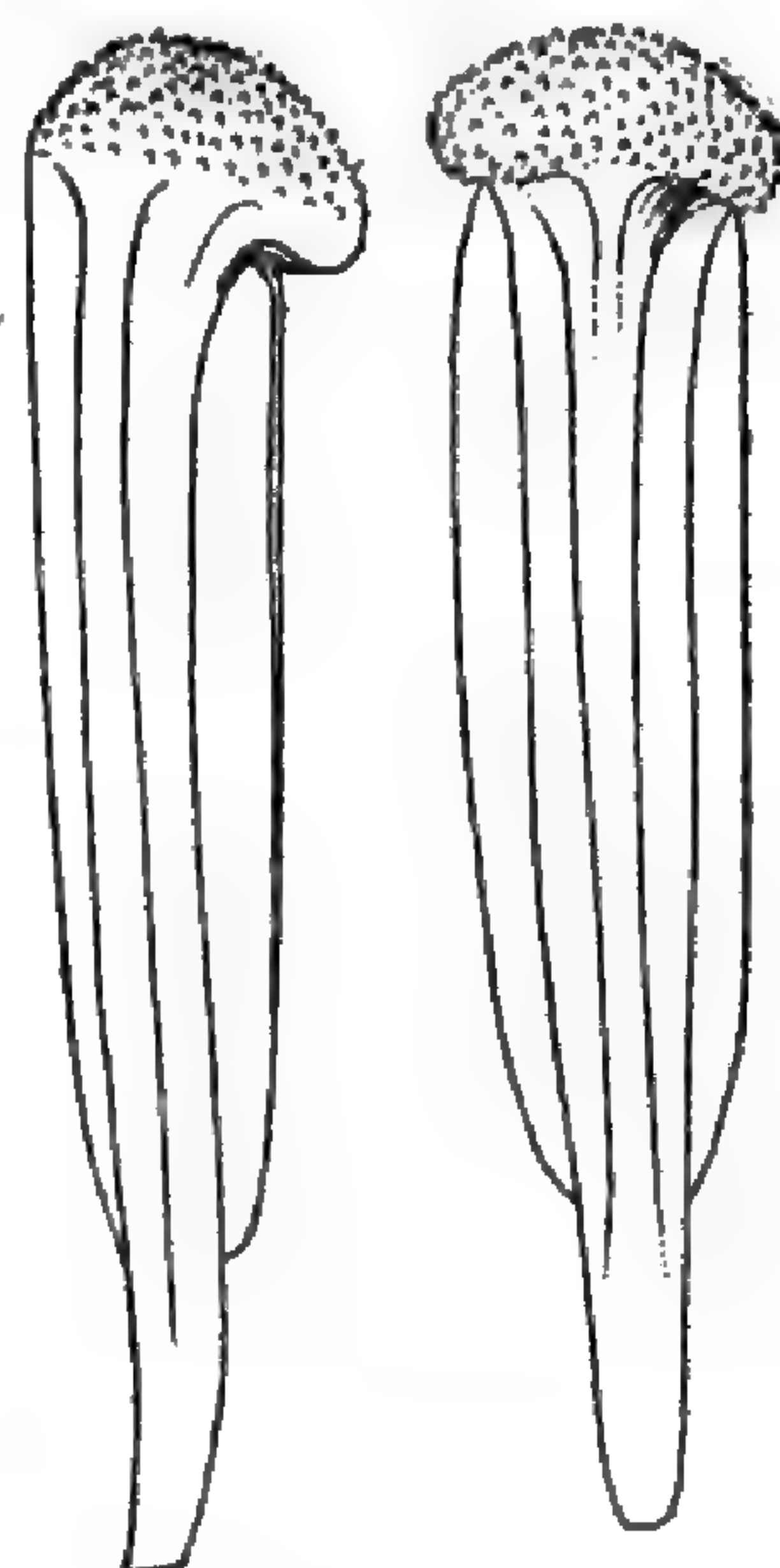


FIG. 38.—Stamens of
Annona salzmanni.
Scale 13.

Type in the De Candolle Herbarium, collected in the vicinity of Bahia, Brazil, on a dry sandy plain ("in sabulosis aridis, an culta ? Arbor superne ramosissima, trunco crasso, altitudine mediocri."), in 1830, by Philipp Salzmänn (no. 5).¹

DISTRIBUTION: Dry sandy plains in the vicinity of Bahia and southward.

SPECIMENS EXAMINED: Type specimen as cited.

LOCAL NAMES: Araticú do campo; Araticú dos lisos ("araticu of the plains").

Annona salzmanni A. DC. bears a certain superficial resemblance to *A. coriacea* Mart. (fig. 37) in its coriaceous leaves and its thick-petaled flowers. It is, however, sharply distinct from the latter. Its leaves are devoid of the minute pits in the axils of the veins, and the lateral nerves together with the reticulated veins between them are remarkable in being impressed on both faces. The stamens of *A. salzmanni* (fig. 38) are

only 4 mm. long, while those of *A. coriacea* are 6 to 6.5 mm. long. The ovaries (fig. 39) are densely clothed with ascending, bright, ferrugineous hairs. It is strange that this quite distinct and valid species is absent from more recent collections of plants from its native region. Its fruit is quite unknown.

De Candolle was inclined to place this species close to *A. glabra* L. (*A. palustris* L.), but it differs from that in its carpels and inner petals. It can not

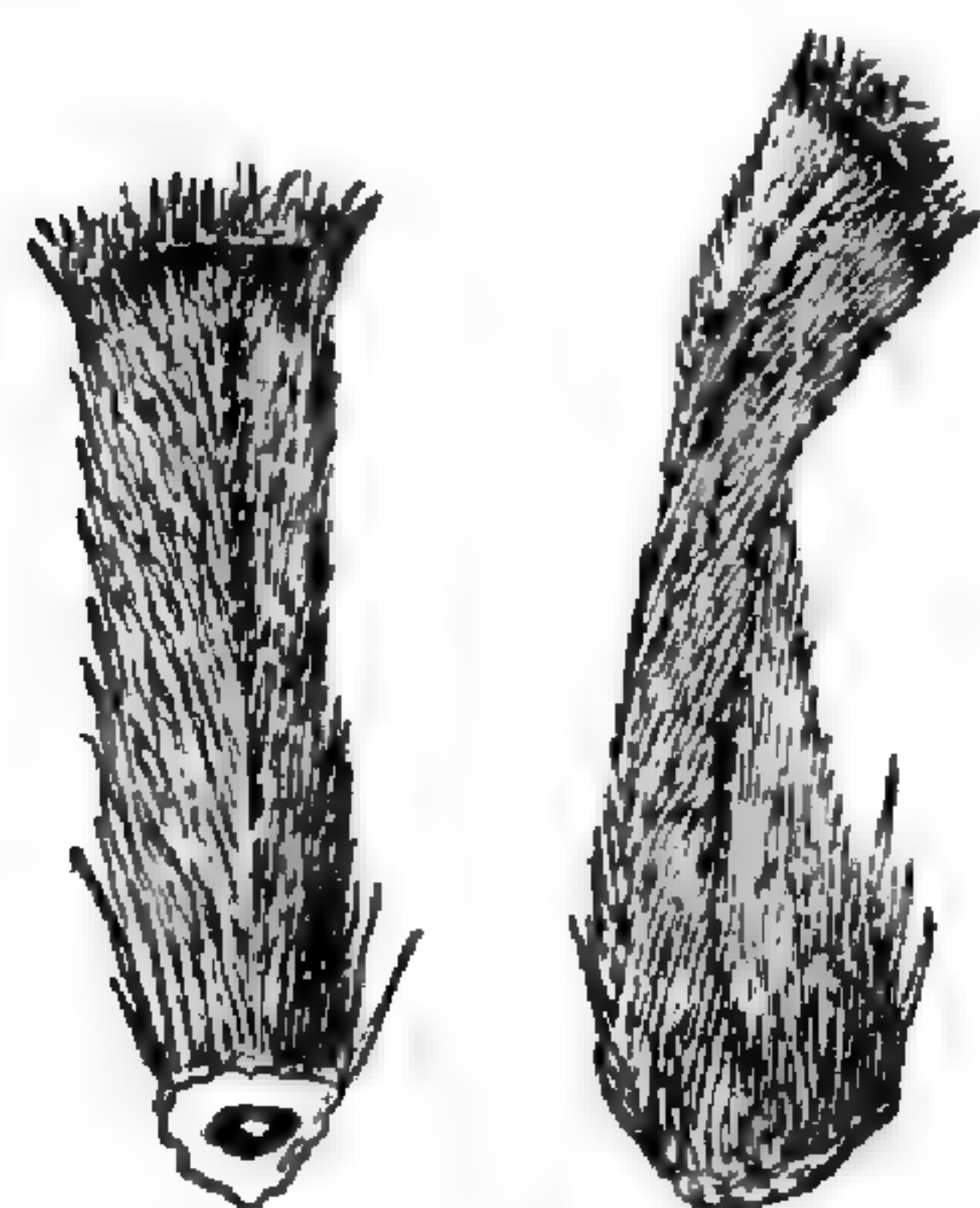


FIG. 39.—Ovaries of
Annona salzmanni.
After loss of styles.
Scale 13.

¹ Salzmänn, Philipp. An enthusiastic botanist and entomologist, in honor of whom De Candolle named the rubiaceaceous genus *Salzmannia* and to whom he dedicated the fourth volume of the *Prodromus*; born at Erfurt, February 27, 1781, died at Montpellier, May 11, 1851. See August Röse, *Bot. Zeit.* 11: 4. 1853.

be placed in the same section with *A. muricata* on account of the peculiar structure of its rigid coriaceous leaves, which are devoid of the peculiar pits in the axils of the lateral nerves, characteristic of the section *Euannonia*; and it is separated from *Annona purpurea* and its allies not only by its leaves but also by its inner petals, which are not imbricate and overlapping. The author has consequently been obliged to place it in a section apart, for which he proposes the name *Psammogenia*, since it comes forth from the sands of arid plains.

EXPLANATION OF PLATE 11.—Photograph of type in the De Candolle Herbarium, showing flower bud, flower from which the petals and stamens have been removed, with the tips of the calyx lobes broken off, a number of loose stamens, an inner petal, and two outer petals. All natural size. Negative by H. K. Sloat.

Annona purpurea Moc. & Sessé.

Annona purpurea Moc. & Sessé in Dunal, Monogr. Anon. 64. pl. 2. 1817.

Annona manirote H. B. K. Nov. Gen. & Sp. 5:59. 1821.

Section *Ulocarpus*. A small or medium-sized deciduous tree with spreading branches and very large short-petioled leaves; older branches brown, bearing prominent leaf scars; young branches clothed at first with fulvous or ferruginous tomentum, but soon glabrate; leaves membranaceous at first, conduplicate, their parenchyma more or less bullate, at length subcoriaceous and undulate, green and smooth above with the impressed midrib and lateral nerves (20 to 25 on each side) very prominent beneath, ferruginous-pubescent on both faces; petioles 5 to 8 mm. long and 3 to 4 mm. thick; blades oblong-elliptical or oblong-obovate to oblong-lanceolate, acuminate above, the apex usually acute, but sometimes obtuse or retuse, obtusely cuneate or rounded at the base, 20 to 30 cm. long and 10 to 14 cm. broad; flowers very large, solitary, extra-axillary, appearing at the same time as the new leaves, usually inclosed at first by an involucre composed of 2 sessile acuminate bracts, these with marcescent apex and persistent base resembling a second, or outer, calyx; peduncle very short and thick, at length woody; calyx 3-lobed, the lobes broadly ovate or deltoid, acute or obtuse at the apex, ferruginous-velvety on the outside; corolla composed of 6 petals in 2 series, increasing in size after anthesis, the 3 outer ovate or ovate-lanceolate, very thick, valvate, concave, usually acuminate but sometimes obtuse at the apex, ferruginous-velvety on the outside, stained with deep purple within; inner petals somewhat smaller and thinner, imbricate, ovate or subrotund, concave, forming a domelike covering over the essential parts, whitish on the outside, purple within; receptacle conoid or hemispherical, densely clothed with short, stiff, straight, light brown hairs; stamens numerous, about 5 or 6 mm. long, club-shaped, with the connectives expanded and swollen into brown velvety heads so closely crowded together as to form a continuous covering above the linear parallel brown pollen sacs; carpels 5 or 6 mm. long, with the ovary about 2.5 to 3 mm. long, sulcate on the inside, clothed with fine light brown sericeous hairs, surmounted by a prism-shaped style of equal length terminating in a capitate pale brown velvety stigma; fruit large, broadly ovoid or spheroid, 15 to 20 cm. in diameter, bearing numerous rigid pyramidal protuberances and clothed with brown feltlike tomentum, the protuberances grooved on the ventral side and usually terminating in a hook directed toward the peduncle; seeds large, obovate, more or less compressed and marginate, 28 to 30 mm. long, 14 to 18 mm. broad, and 9 mm. thick, with a smooth chestnut brown testa covered when fresh by a thin membranous closely adhering envelope (aril ?)

and imbedded in fragrant mango-flavored orange-colored fibrous pulp. (PLATES 12-14. FIGURE 40, *a*.)

Described by Mocino & Sessé from a specimen without fruit, bearing flowers and young leaves; description published by Dunal as cited above, accompanied by a plate engraved by Moquin. "Hab. in Mexico," without definite locality.

DISTRIBUTION: State of Veracruz, Mexico, to Panama, and northern South America.

SPECIMENS EXAMINED:

MEXICO: Córdoba, Veracruz, *E. Kerber*, July, 1882 (Berlin Herb.), photograph of globose fruit covered with sharp hooked protuberances, *C. B. Waite* 1515; Omealca, Veracruz, seeds, *C. B. Waite*, S. P. I. no. 31891¹; Tehuantepec, seeds, *W. W. Miller*, S. P. I. no. 34050¹; Tapachula, Soconusco, State of Chiapas, photograph, *Guy N. Collins* 4007.

COSTA RICA: Nicoya, along roadsides, *Tonduz* 13932; Puerto Jesús, Nicoya, *Cook & Doyle* 745, with photograph 5814; El Coyolar, near Punta Arenas, alt. 150 meters, fruit, flowers, and leaves, *Wercklé*, S. P. I. no. 31929.¹

PANAMA: Matachín, on Panama Railway, *Hayes*, September 8, 1860; without definite locality, *Duchassaing*; Hospital grounds, Ancon, *Pittier* 3955; Forests of San Felix, eastern Chiriquí, *Pittier* 5749.

VENEZUELA: Above Dos Caminos, east of Carácas, alt. 850 meters, *Pittier* 6221.

LOCAL NAMES: Cabeza de negro, or "negro-head" (Veracruz); Cabeza de ilama, or "old woman's head" (Veracruz and Oaxaca); Chincua, Ilama de Tehuantepec (Oaxaca); Soncoya, Soncolla, Sencuya (Central America); Toreta (Panama); Manirote (Venezuela).

Annona purpurea has hitherto been imperfectly known. At the time of its flowering it is almost devoid of leaves. The fruit was lacking in the type material and it has been confused, on account of its protuberances, with that of the soursop (*A. muricata*), the resemblance between the flowers of the two species adding to the confusion. Those of the present species, however, are easily distinguished by their very short, thick peduncle, and the fruit by its yellow fibrous pulp and large seeds (fig. 40). The common name "cabeza de ilama" ("old woman's head") applied to the fruit on the isthmus of Tehuantepec, is apt to cause it to be confused with that of *A. diversifolia*,² called "ilama" at Colima and Acapulco; but the latter species is easily distinguished by the persistent leaflike, amplexicaul bracts at the base of its long peduncle, its much smaller leaves rounded at the apex, the rose-tinted pulp of its fruit, the shape of the latter which resembles that of a pineapple cheese, and its hard, nutlike, subterete seeds.

The identity of *Annona manirote* H. B. K. with *A. purpurea* Moc. & Sessé was suspected by the writer, as the latter corresponds closely with the description of the leaves and fruit of the former. In the type material of *A. manirote* flowers were lacking. These, however, have been recently collected by Professor Henry Pittier above Dos Caminos, a short distance east of Caracas, at an elevation of 850 meters above sea level (pl. 13). Professor Pittier collected both old leaves of the preceding season, which had nearly all

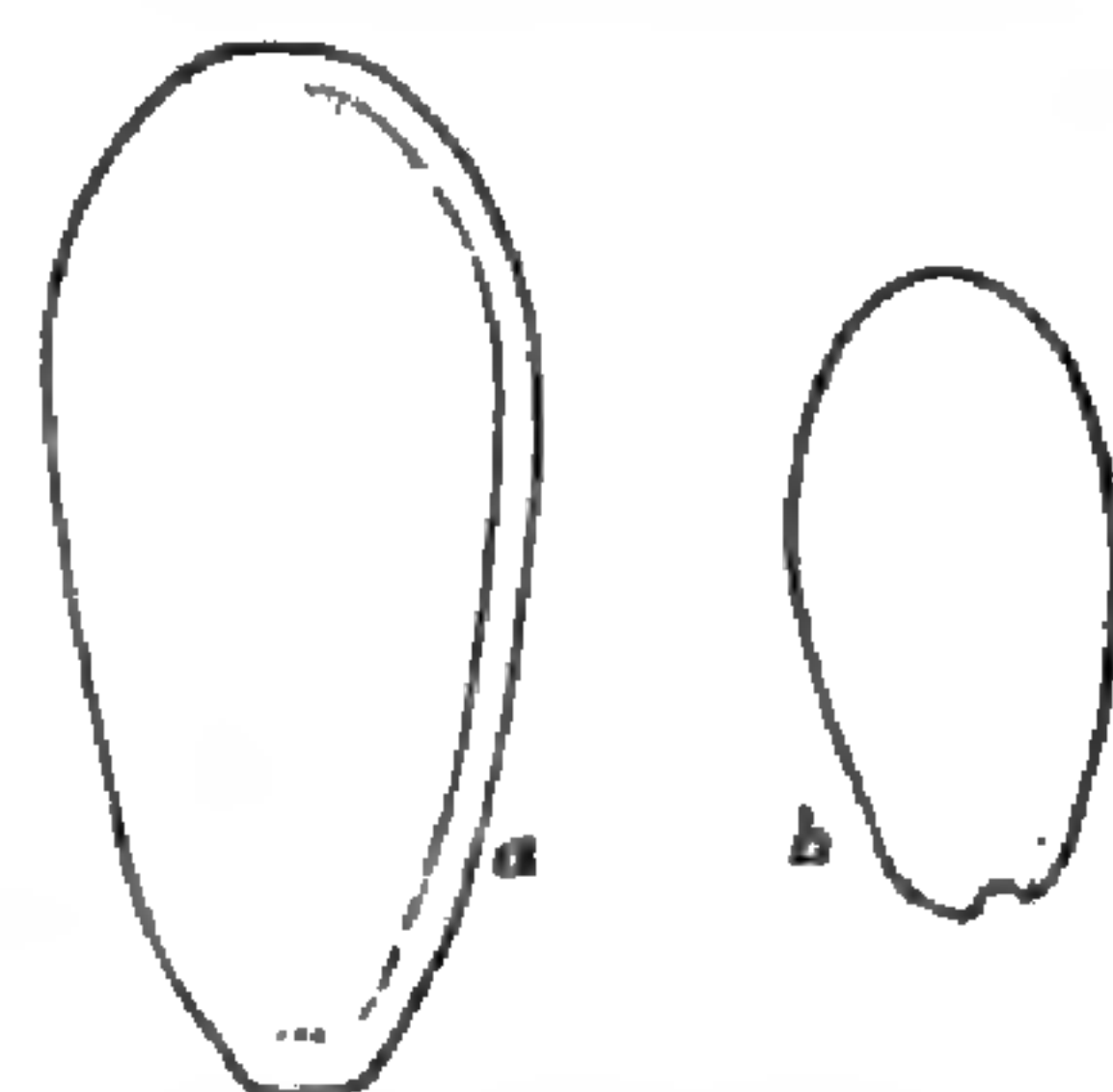


FIG. 40.—(*a*) Seed of *Annona purpurea* and (*b*) one of *A. muricata*. Natural size.

¹ Collections of the Division of Seed and Plant Introduction, Bureau of Plant Industry, U. S. Department of Agriculture.

² *Annona diversifolia* Safford, Journ. Washington Acad. Sci. 2: 118. 1912.

fallen, and new leaves, which were just appearing with the flowers. The species is known in Venezuela by the common name "manirote." The following is an extract from Professor Pittier's field notes, dated May 24-25, 1913: "*Annona manirote*. Tree small, 3 meters high with depressed crown, nearly leafless at time of blooming, bearing only a few new leaves; flowers very large, yellowish green, having a strong, unpleasant, cestrum-like odor."

Alcoholic as well as dry herbarium material was brought home by Professor Pittier, and a photograph was secured of the fresh leaves and a mature flower with elongated petals. A careful study of these establishes the identity of *Annona manirote* H. B. K. with *A. purpurea* Moc. & Sessé, beyond a doubt.

EXPLANATION OF PLATES 12-14.—Pl. 12, photograph, by Collins, of specimen closely resembling Mocino and Sessé's type as shown in plate 2 of Dunal's monograph, with branches bearing prominent leaf scars and with young leaves and immature, solitary, extra-axillary flowers from the base of which the involucre are lacking. One flower with an outer and an inner petal removed shows the essential parts as crudely figured on Dunal's plate. Pl. 13, field photograph, by Pittier, of specimen growing in Venezuela, showing old branch with flower subtended by involucre, and new branch, bearing leaves. Pl. 14, fruit collected at Ancon, Isthmus of Panama, by Pittier (no. 3955); photograph by Crandall. Natural size.

Annona involucrata Baill.

Annona involucrata Baill. *Adansonia* 8: 265. 1868.

Annona prestoei Hemsl. in Hook. Icon. Pl. IV. 6: 2519, 2520. 1897.

Annona muricata Wercklé, *Tropenpfl.* 428. 1903, not L. Sp. Pl. 536. 1753.

Section *Ulocarpus*. A tree with the young branches yellowish or ferruginous-tomentose, soon glabrescent, becoming light brown and covered thickly with lenticels; leaves short-petioled, large, broadly elliptical to obovate-oblong or obovate-lanceolate, shortly and often abruptly acuminate above the apex, usually obtuse or retuse, but sometimes acute, rounded or subcuneate at the base, 28 to 30 cm. long, 15 to 17.5 cm. broad, at first membranaceous, at length subcoriaceous, the midrib and primary nerves (22 to 28 on each side) impressed above, prominent beneath, ferruginous-tomentose above at first, but at length glabrate, persistently ferruginous-tomentose beneath; petiole 5 to 10 mm. long, thick and grooved above, ferruginous-tomentose at first, at length glabrescent; flowers solitary, subsessile, extra-axillary, resembling those of *A. purpurea*, the young buds enveloped in an involucre of 2 imbricating bracts resembling bud scales, more or less persistent and suggesting a second or outer calyx; involucre, calyx, and outer petals densely and shortly ferruginous-tomentose; calyx lobes broadly ovate, 2.5 to 3 cm. long, the 3 outer petals valvate, very thick, ovate-lanceolate, usually acute or acuminate but sometimes obtuse at the apex, cordate at the base, 3.5 to 6.2 cm. long by 3 to 3.5 cm. broad; 3 inner petals imbricate or overlapping, thinner than the outer and suborbicular or broadly ovate and rounded at the apex; receptacle hemispherical, clothed with minute bristle-like straight hairs; stamens 6 mm. long, very numerous, similar to those of *A. purpurea*, the thickened truncate crowded connectives clothed with brown velvety puberulence composed of short straight hairs; carpels numerous, 6.5 mm. long, the ovaries sericeous-hirtellous and scored with a median groove on the inner or ventral side; style prism-shaped, terminating in a swollen glandular velvety stigma; fruit spheroid, 10 to 12.5 cm. in diameter, covered with rigid pyramidal protuberances, more or less 4-cornered, with a median groove or fissure on the side opposite the peduncle, very much as in *A. purpurea*, but with the apex not produced into a hook; seeds resembling those of *A. purpurea*, obovoid, compressed, marginate, the chestnut-brown testa roughened on its inner surface to conform with the

wrinkles of the endosperm; ripe pulp yellow or orange-colored, fibrous, and fragrant, like that of *A. purpurea*. (PLATES 15, 16.)

Type in the Botanical Museum of Copenhagen, collected at Tlatatla in the mountains of Veracruz, Mexico, July, 1841, by Liebmann (no. 25).

DISTRIBUTION: Mountains of Veracruz, Mexico, Guatemala, Salvador, and possibly Venezuela; in cultivation on the Island of Trinidad.

SPECIMENS EXAMINED:

GUATEMALA: Between Secanquím and Cahabón, mountains of Alta Verapaz, April 20, 1904, with young flower buds inclosed in involucre, *Cook* 87; Cucanhá, near Tucurú, Alta Verapaz, June 6, 1904, herbarium specimens and photographs of flowers, leaves, and young fruit, *Cook* 314, photographs 7463, 7464. (All U. S. Nat. Herb.)

SALVADOR: Without definite locality, but presumably near the city of San Salvador, *Renson* 271.

ISLAND OF TRINIDAD: Botanical Garden, as *H. prestoei* Hemsl. (Herb. John Donnell Smith).

LOCAL NAMES: Soncoya, Sincuya (southern Mexico and Guatemala); Matacuy (Alta Verapaz, Guatemala).

Annona involucrata is very closely allied to *A. purpurea*, of which it may possibly prove to be a broad-leaved variety. The types of both species are Mexican. It is distinguished principally in the short abrupt acumination of the leaves, with a small terminal point which is often retuse or at least obtuse, while the leaves of the typical *A. purpurea* are more gradually acuminate. The flowers of the two species can scarcely be distinguished from each other. In both of them there is considerable variation in the size and shape of the petals, and in both the young flower bud is inclosed at first in an envelope of imbricating bracts.

On carefully comparing a specimen of the leaves of *A. prestoei* Hemsl., in the herbarium of Capt. Donnell Smith, with the leaves of the present species, the author could not discover points of difference between them warranting their separation into distinct species. A comparison of Hemsley's figures above cited with the photographs presented in the present paper indicates that the two species are in all probability identical. Further investigation may show that they ought both to be referred to *A. purpurea* Moc. & Sessé.

Obtuse-pointed fruits collected in Costa Rica were received from Mr. Carlos Wercklé, who, in answer to questions relating to the hook-pointed fruits, said that he had never seen fruits of that character. The fruits referred to by him in a paper published in the *Tropenpflanzer*, cited above, must have been of the blunt-pointed form, and consequently they are here referred to the present species. Subsequently Mr. Wercklé forwarded hook-pointed fruits to the United States Department of Agriculture, stating that in his opinion the two forms are variations of the same species, and in a letter dated July 15, 1913, he writes: "There is absolutely no difference in the flowers and the leaves between the soncoyas. On some fruits the pyramids are more sharply pointed than on others, sometimes even on the same tree, and often more or less recurved, especially on young fruits." It is, therefore, quite possible that *Annona involucrata* Baill. together with *A. prestoei* Hemsl. will eventually have to be reduced to *A. purpurea* Moc. & Sessé, and it is also possible that the type of Hemsley's *A. prestoei*, growing in Trinidad, was introduced upon that island from Venezuela, in which case it is to be identified with *A. manirote* H. B. K., a species which also proves to be identical with *A. purpurea* Moc. & Sessé.

EXPLANATION OF PLATES 15, 16.—Pl. 15, leaf, flower, gynœcium, and immature fruit with involucre beneath the calyx, collected by Mr. O. F. Cook at Cucanhá, near Tucurú, Alta Verapaz, Guatemala. Natural size. Photograph by C. B. Doyle. Pl. 16, branch with old leaves and an extra-axillary sessile flower bud inclosed in an involucre. Natural size.

Annona paludosa Aubl.

Annona paludosa Aubl. Fl. Guian. 1:611. pl. 246. 1775.

Section Helogenia. A shrub 120 to 150 cm. high; young branches densely ferrugineous-tomentose, at length glabrate and bearing numerous light brown lenticels; leaves shortly petiolate, oblong to elliptical-oblong, acute, rounded at the base, above sparsely pubescent, at length glabrescent, beneath clothed with persistent soft velvety ferrugineous or cinnamon-colored tomentum;

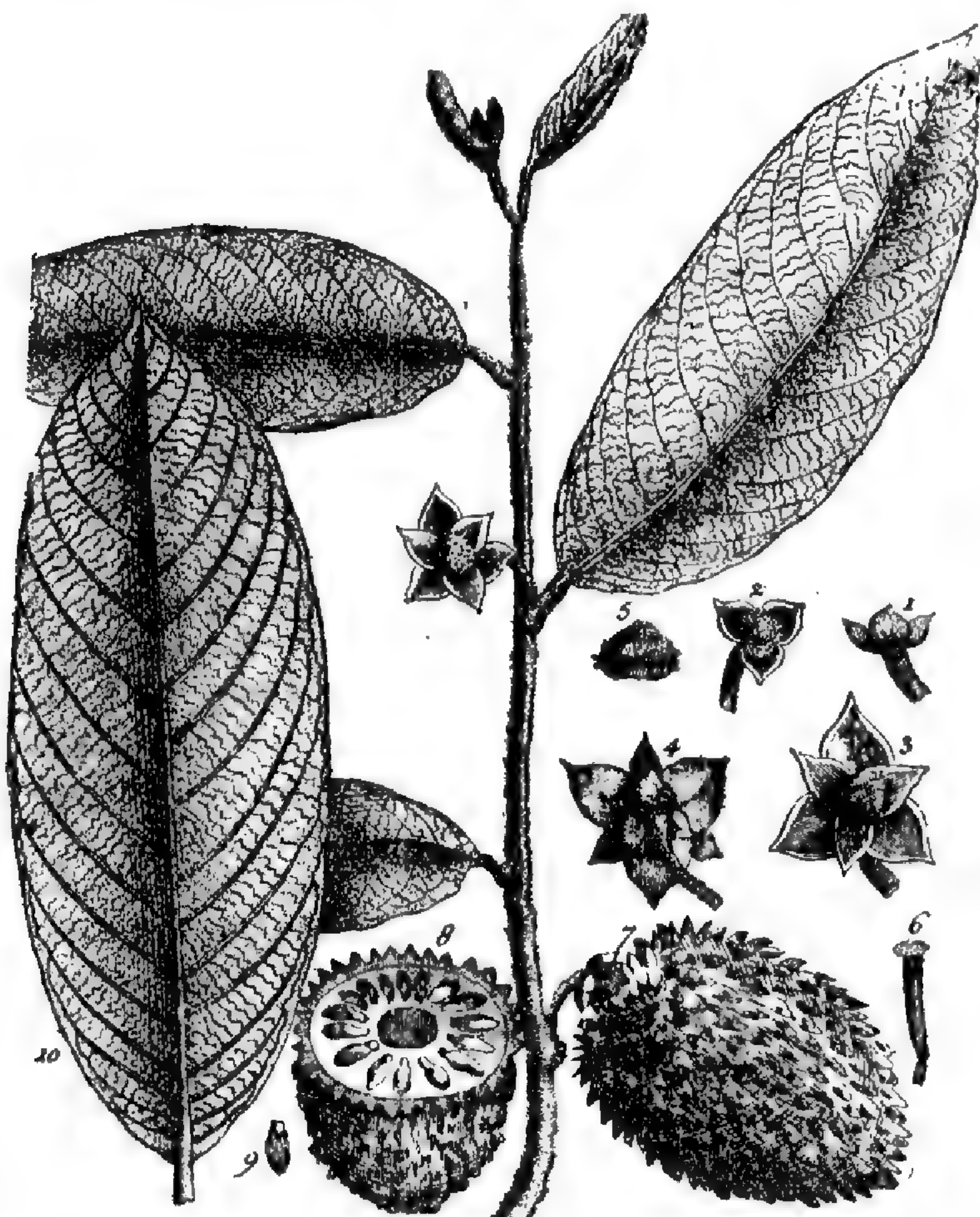


FIG. 41.—*Annona paludosa*. 1, calyx, lateral view; 2, calyx seen from above; 3, 4, flowers; 5, androecium and gynoecium; 6, stamen; 7, fruit, showing persistent calyx; 8, section of fruit; 9, seed; 10, leaf. Reproduced from Aublet at one-half original size.

midrib and lateral nerves (about 18 to 20 on each side) impressed above, prominent beneath, the latter with approximate diagonal veins between them; blade thin-membranaceous, punctate, with a tendency to curl inward in drying (as in *A. jenmanii* Safford), 16 to 20 cm. long and 6 to 7.5 cm. broad; petiole about 5 mm. long and 3 mm. thick, broadly grooved above and clothed with dense tomentum; peduncles solitary or in pairs, 10 to 15 mm. long, extra-axillary, usually opposite a leaf, clothed with tomentum and usually bearing a broad semi-amplexicaul acute bracteole above the middle and one at the base; flower buds depressed-globose, 20 to 25 mm.

broad and about 15 mm. high; calyx gamosepalous, subtriangular or 3-lobed, the lobes 10 mm. broad and scarcely 10 cm. high, sharply acuminate, clothed on the outside with ferrugineous tomentum like that on the peduncle and more or less plicate; petals 6, the three outer ones thick and valvate, broadly ovate, acute, 15 to 18 mm. broad and 15 mm. high, concave, clothed on the outside with fine velvety rufous tomentum with a median ridge and parallel plications and within with fine grayish rufous tomentulum; inner petals smaller and relatively much narrower than the outer and alternating with them, so as to close the cracks between them, connivent above the essential parts but with their margins thin and not meeting (neither valvate nor imbricate), about 6 mm. broad and 14 or 15 mm. high, concave, keeled on the outside and clothed both without and within with fine grayish tomentulum; torus convex, clothed with

straight glossy translucent whitish hairs; stamens numerous, crowded, 2.8 to 3 mm. long; pollen sacs 2.1 mm. long, the pollen orange-colored in 2 columns of tetrads in each sac; connective minutely muriculate, swollen at the extremity into a depressed cap, apparently light brown and velvety, but as seen under the microscope muriculate with fine glossy points or short straight diaphanous hairs, carpels numerous, the ovary pale rufous-sericeous; styles linear-oblong, minutely granular on the sides, when mature terminating in a swollen, minutely tuberculate extremity; fruit ovoid, yellow, tomentose, about 6 mm. long and 4 cm. in diameter, muricate with slender acute fleshy points and usually bearing the persistent calyx; seeds small, about 8 mm. long and 4 mm. broad, smooth, ovoid, slightly compressed, with a conspicuous caruncle at the base; pulp soft and fleshy, edible, but with less flavor than that of *A. squamosa*. (PLATES 17, 18, B. FIGURES 14, 41-43.)

TYPE LOCALITY: "Habitat in pratis paludosis Courou & Timoutou," coast of French Guiana.

DISTRIBUTION: Known certainly only from French Guiana, in marshy situations at Kouroutou on the coast, west of Cayenne (type locality), but occurring also, according to Sagot, in the interior.

SPECIMENS EXAMINED:

FRENCH GUIANA: Without definite locality, *Leprieur* in 1840 (Herb. De Candolle, no. 11, with geminate flowers not quite mature); *Leprieur* in 1834 (Berlin Herb. ex Mus. Paris, no. 238), with immature flower bud.

LOCAL NAMES: Guimamé, according to Sagot; Corossol sauvage, according to Aublet (French Guiana).

Although *Annona paludosa* has a 6-petaled corolla it resembles *A. sericea*, in which there are normally but 3 petals. The latter, however, as Sagot has pointed out, sometimes has 6 petals in rainy seasons, as though making special provision for guarding its essential parts from moisture. The only figure of *A. paludosa* known to the author is the original illustration of Aublet (see fig. 41) which, like Dunal's figure of *A. sericea*, but poorly represents the flower and the essential parts. On this account a photograph of the species from its type locality is here presented (pl. 17). It is interesting to note that, though this specimen has geminate flowers, the smaller flower of the pair is abnormal, having only 2 calyx lobes, 2 outer petals, and probably 2 inner petals.

Though listed by Martius as occurring in Brazil, it is quite certain that he never saw a specimen from that country and that he gives a description of the plant entirely at second hand. His statement that the peduncles are solitary and without bracteoles is incorrect. In the original description of Aublet they are correctly described as solitary or two together and provided at the base and also near the middle with a "scale"; though Aublet also is mistaken in saying that they issue from a leaf axil. They are extra-axillary, as in most other species of *Annona*, and in the present specimen are opposite a leaf. It appears that the second or smaller flower issues from the basal scalelike bracteole of the first flower and bears no bracteole near the middle of the

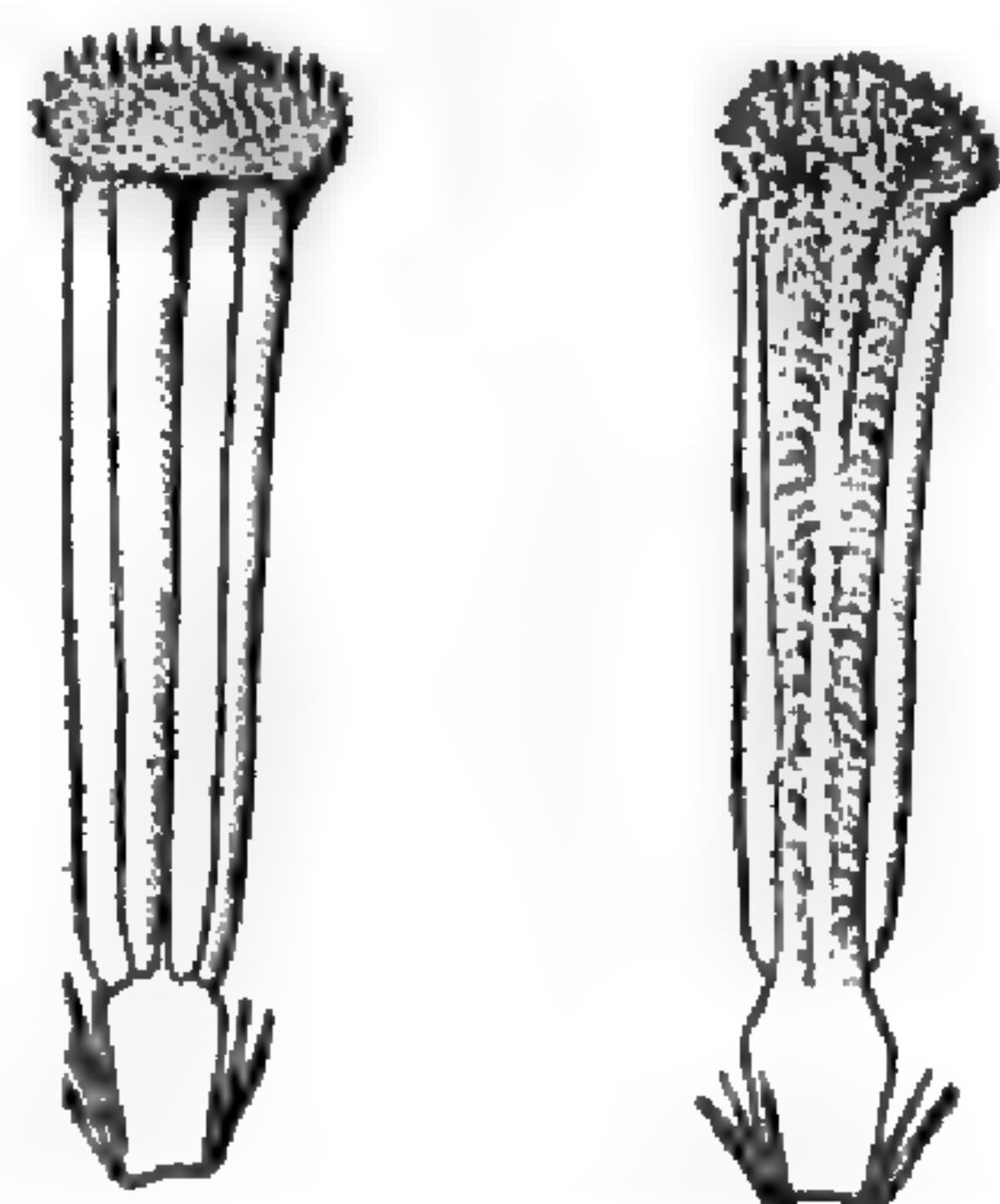


FIG. 42.—Stamens of *Annona paludosa*. Left hand, dorsal view, showing pollen sacs; right hand, ventral view. Scale 10.

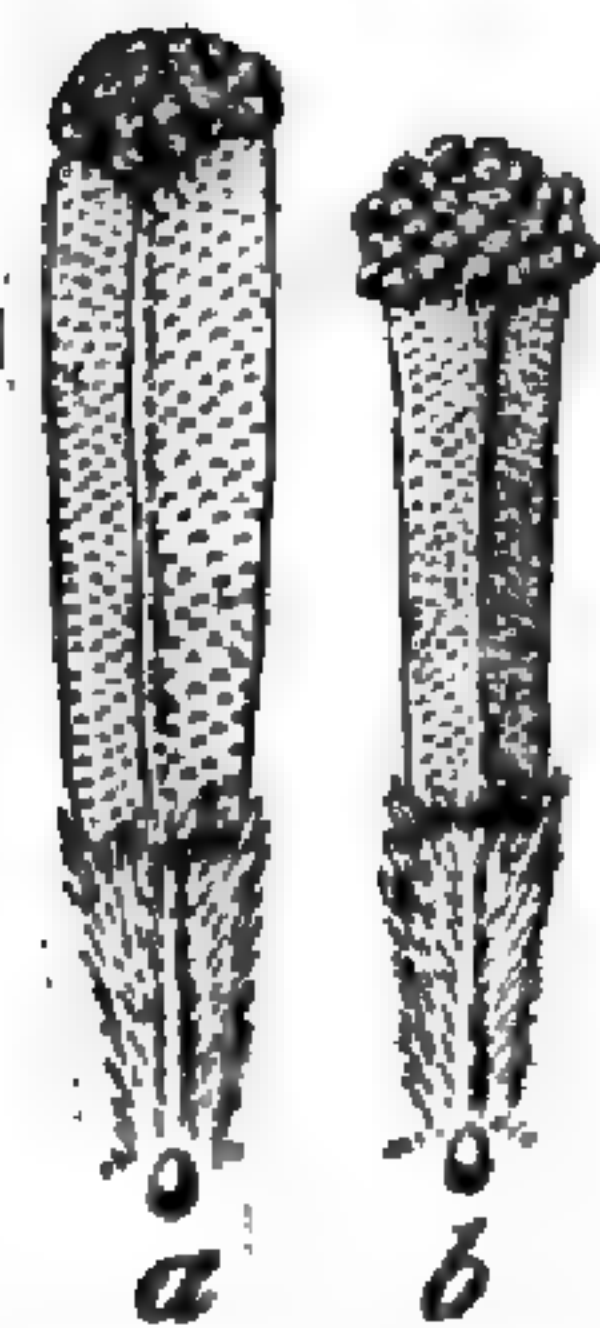


FIG. 43.—Carpels of *Annona paludosa*. a, Outer carpel; b, inner. Scale 13.

peduncle. The bracteole on the peduncle of the larger flower is scarcely perceptible in the photographs. The approximate lateral nerves and the parallel veins between the lateral nerves suggest the leaves of *A. purpurea* Moc. & Sessé, but the broad-clawed, imbricate inner petals of the latter separate that and its close allies from the present species, in which the inner petals are narrow and appear simply to play the part of weather strips.

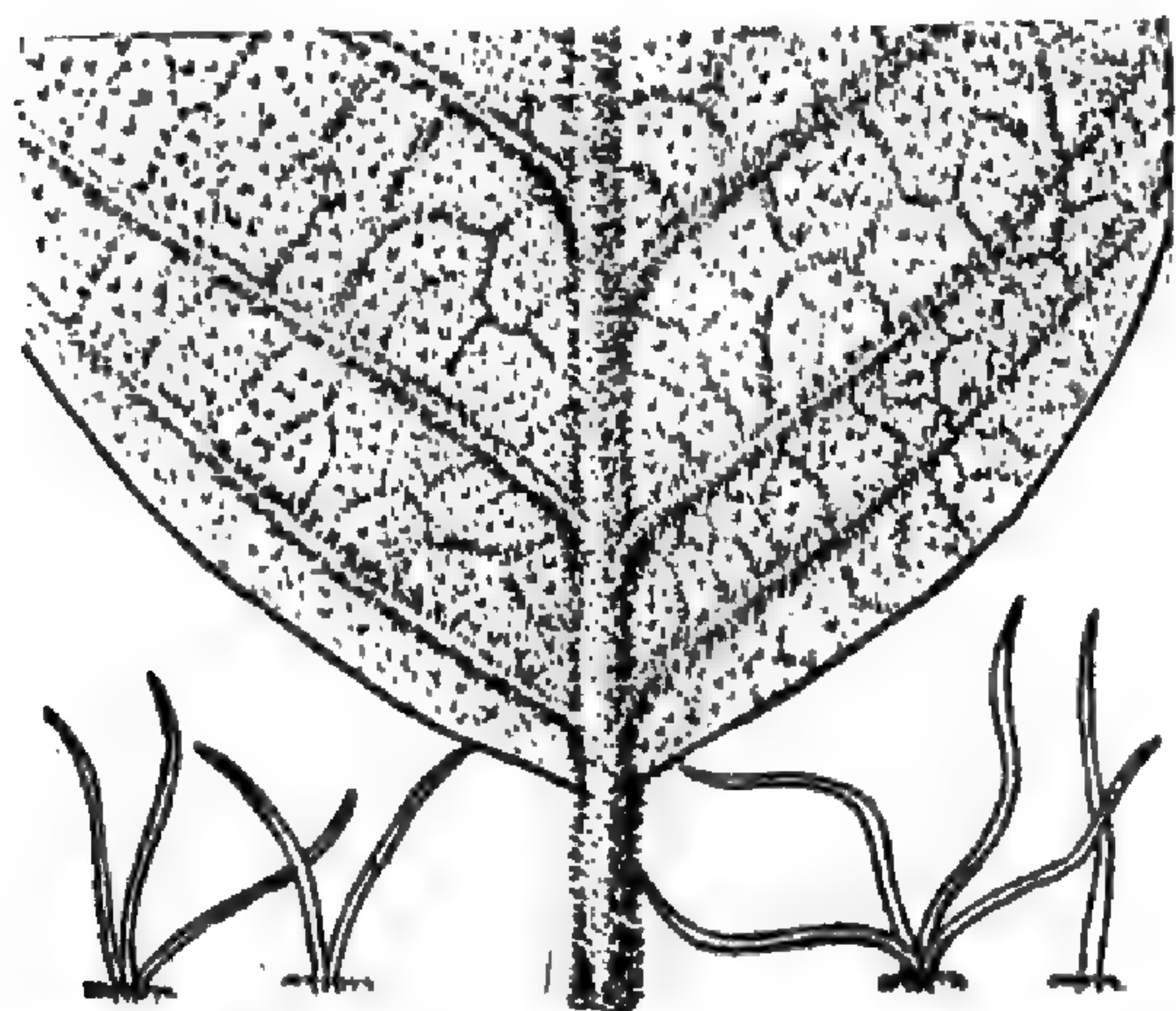


FIG. 44.—Base of leaf of *Annona jahnii*. Also detached solitary and fascicled hairs. Leaf, natural size; hairs, scale 25.

lenticels; leaf scars lined with dense rufous pubescence; hairs solitary or fascicled in tufts of 2 to 4, not stellate; leaves yellowish green when fresh, membranaceous, pellucid-punctate, broadly obovate to obovate-oblong, acuminate, with the narrow apex acute or rounded, rounded or acutish at the base, 12.5 to 18 cm. long and 7 to 10 cm. broad, above pubescent at first, at length glabrate except along the impressed midrib and lateral nerves (10 to 14 on each side), beneath persistently rufous-pubescent, densely so on the prominent midrib, lateral nerves, and anastomosing veins; hairs fascicled or solitary; petiole 6 to 8 mm. long, grooved above, densely rufous-pubescent like the midrib; peduncles solitary, extra-axillary, 12 to 15 mm. long, issuing from the young branches, clothed with rufous hairs and bearing a small, broad, sessile or subamplexicaul, pubescent bracteole near the middle; calyx rufous-pubescent on the outside, quite glabrous within, gamosepalous, subtriangular, with the 3 lobes long-acuminate; corolla subglobose or broadly pyramidal in bud, about 22 mm. in diameter; petals 3, valvate, very thick, broadly ovate, somewhat cordate at the base, 20 mm. high and 18 mm. broad, clothed on the outside with fine olivaceous appressed pubescence scarcely apparent without a microscope, lined within with grayish tomentulum and bearing the imprints of the stamens, inner petals entirely absent; torus convex or dome-shaped, densely clothed with short erect straight yellowish white hairs; stamens numerous, 2.5 to 2.8 mm. long, the parallel pollen sacs filled with lemon yellow pollen grains in 2 rows of tetrads and capped by the expanded brown-velvety apex of the connective, muriculate under the microscope; gynœcium depressed-conoidal; carpels (including the styles) 2.6 to 2.8 mm. long, free, the ovary clothed with appressed

EXPLANATION OF PLATES 17, 18.—Pl. 17, photograph of *Annona paludosa*, Leprieur's specimen as cited. Natural size. Pl. 18, A, flower of *Annona cornifolia*, being a back view of specimen shown in plate 20; B, flower of *Annona paludosa*. A, scale 2; B, scale 2.5.

Annona jahnii Safford, sp. nov.

Section Pilannona. A flat-crowned tree with spreading branches, 4 to 6 meters in height; young branches rufous-pubescent, at length glabrescent, the bark brown, longitudinally plicate, and bearing a few inconspicuous brown

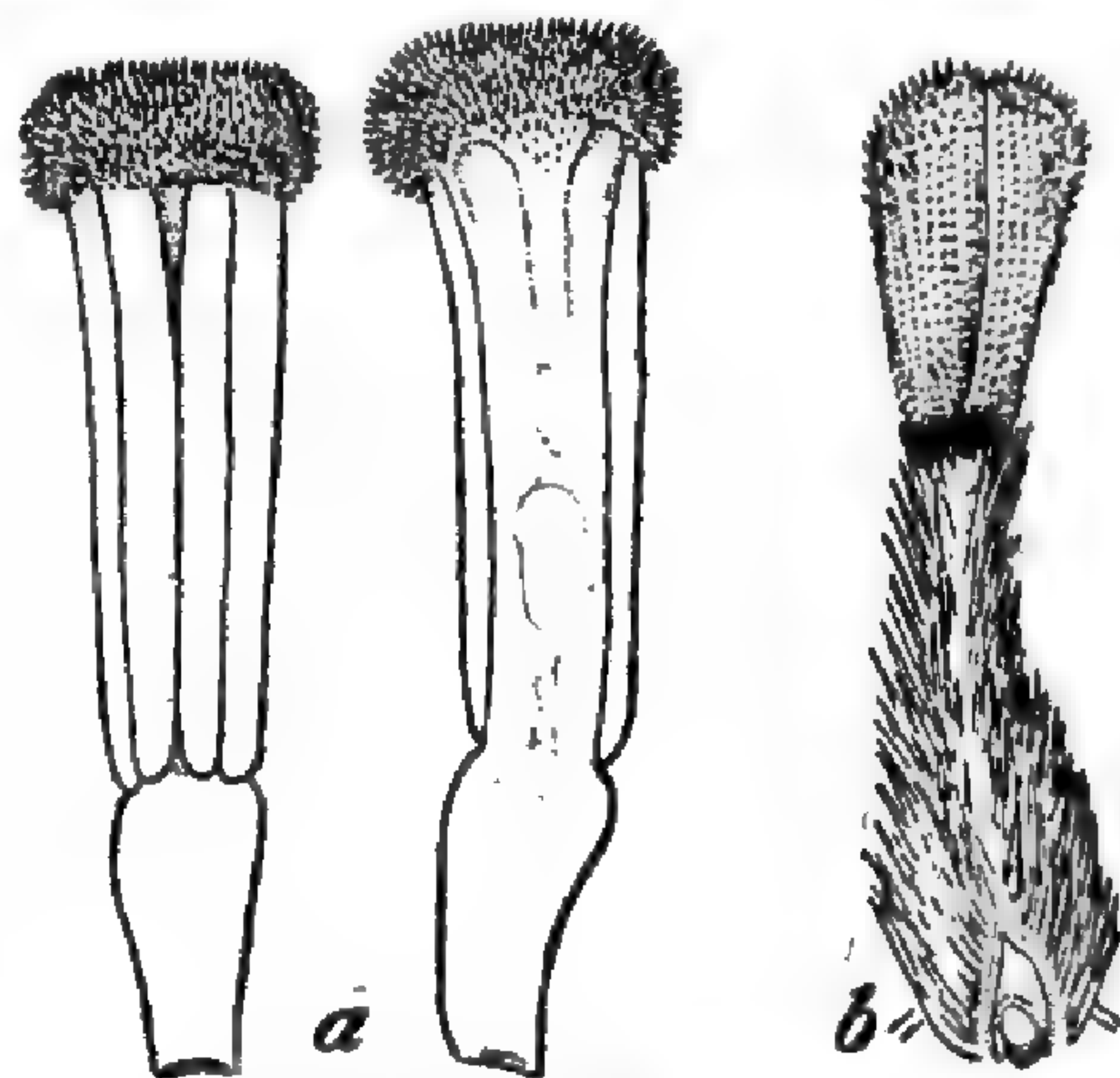


FIG. 45.—(a) Stamens and (b) carpel of *Annona jahnii*. Scale 13.

pale fulvous or yellowish white hairs, tapering upward and surmounted by a fleshy truncated stigma about half its length, this grooved longitudinally on the ventral side and covered with minute short straight hairs and glandular tubercles; fruit ovoid, small, resembling the fruit of *Annona echinata*, that of the type material (immature) about 4.5 cm. long and 3 cm. in diameter, sometimes reaching 7 cm. in length with a diameter of 4 cm., muricate with numerous pyramidal protuberances spirally arranged, clothed with dense rufous or ferrugineous pubescence, marked with a longitudinal groove on the side opposite the peduncle, as in *A. purpurea*, and terminating in a hooked point recurved toward the peduncle, the latter somewhat thickened and woody when mature and bearing the persistent triangular calyx; seeds (immature) 9 to 10 mm. long and 4 to 5 mm. broad, the testa brown and smooth but not polished, truncate at the apex and bearing at the base a conspicuous caruncle; pulp edible, sweet and pleasantly flavored. (PLATE 19. FIGURES 44, 45.)

Type in the U. S. National Herbarium, no. 692739, collected and photographed on the Hacienda Solorzano, Borburata Valley, a short distance southeast of Puerto Cabello, Venezuela, July 14, 1913, by H. Pittier (no. 6465).

This species is named in honor of Dr. Alfredo Jahn of Carácas, civil engineer and botanist, to whom Professor Pittier is indebted for many courtesies and for valuable botanical information received while on his recent mission to Venezuela.

SPECIMENS EXAMINED:

VENEZUELA: Hacienda Solorzano, near Puerto Cabello, Pittier 6465 (type).

COLOMBIA: In thickest forests, on margins of streams, Río Meta, at Ororué, Lehmann 8824 (Berlin Herb.).

DISTRIBUTION: Coast of Venezuela to Río Meta, Colombia.

LOCAL NAME: "Manirito," a diminutive form of "manirote," the local name of *A. purpurea*, applied to it on account of the resemblance of the fruits of the two species.

EXPLANATION OF PLATE 19.—Field photograph of the type. Fruit not yet mature. Natural size.

Annona cornifolia St. Hil.

Annona cornifolia St. Hil. Fl. Bras. Merid. 1: 33. 1825.

Section Gamopetalum. A low shrub or undershrub sometimes less than a foot in height, with simple or branching stems glabrous at the base and ferrugineous-pubescent or tomentose on the upper part, especially near the apex; hairs simple, not stellate; branches axillary, slender, straight, ascending; leaves membranaceous, broadly ovate, or in the same specimen ovate and obovate and sometimes subrotund, obtuse or acutish at the base, acutish or sometimes obtuse at the apex, frequently mucronulate, the apex terminating in a minute rigid point, 5 to 10 cm. long and 2.5 to 6 cm. broad, above sparsely puberulent, at length glabrous or nearly so, beneath puberulent or pubescent and canescent, with the prominent midrib and lateral nerves more or less rufous-tomentose; petiole 3 or 4 mm. long, broadly grooved above, convex beneath, rufous-tomentose like the midrib; peduncles solitary or geminate, extra-axillary, often opposite a leaf, or apparently terminal by the abortion of the stem or branch beyond them, when geminate usually subtended at the common base by a sessile leaflike bract (the latter rufous-tomentose beneath on its midrib and lateral nerves), 1-flowered, usually incurved or nodding, thickened from the base to the apex, 2.5 to 6 cm. long, clothed with appressed ferrugineous hairs and bearing a small ferrugineous-tomentose or pubescent bracteole near the middle and one at the base, the hairs straight or floccose; calyx small, ferrugineous-

villous on the outside, 3-lobed, the divisions ovate-acuminate with a midrib or median keel; corolla depressed-spherical in bud, bowl-shaped and about 2.5 cm. broad when expanded, gamopetalous, 6-lobed, with 3 narrow lobes corresponding to inner petals alternating with 3 broad lobes which overlap their edges, corolla lobes rufous-pubescent, much larger than the calyx divisions, the outer ones broadly ovate, acute, pale yellow or whitish, with a purple spot within near the base; inner lobes oblong-elliptical or obovate-oblong, much narrower than the outer and somewhat shorter, shortly acuminate at the apex and keeled on the back, pale yellow or whitish on the outside, spotted with purple or entirely purple within; torus consisting of an outer convex or hemispherical ring, and an inner cone bearing the gynoecium, the ring more or less pubescent between the bases of the thickly crowded stamens and surrounded by a fringe of

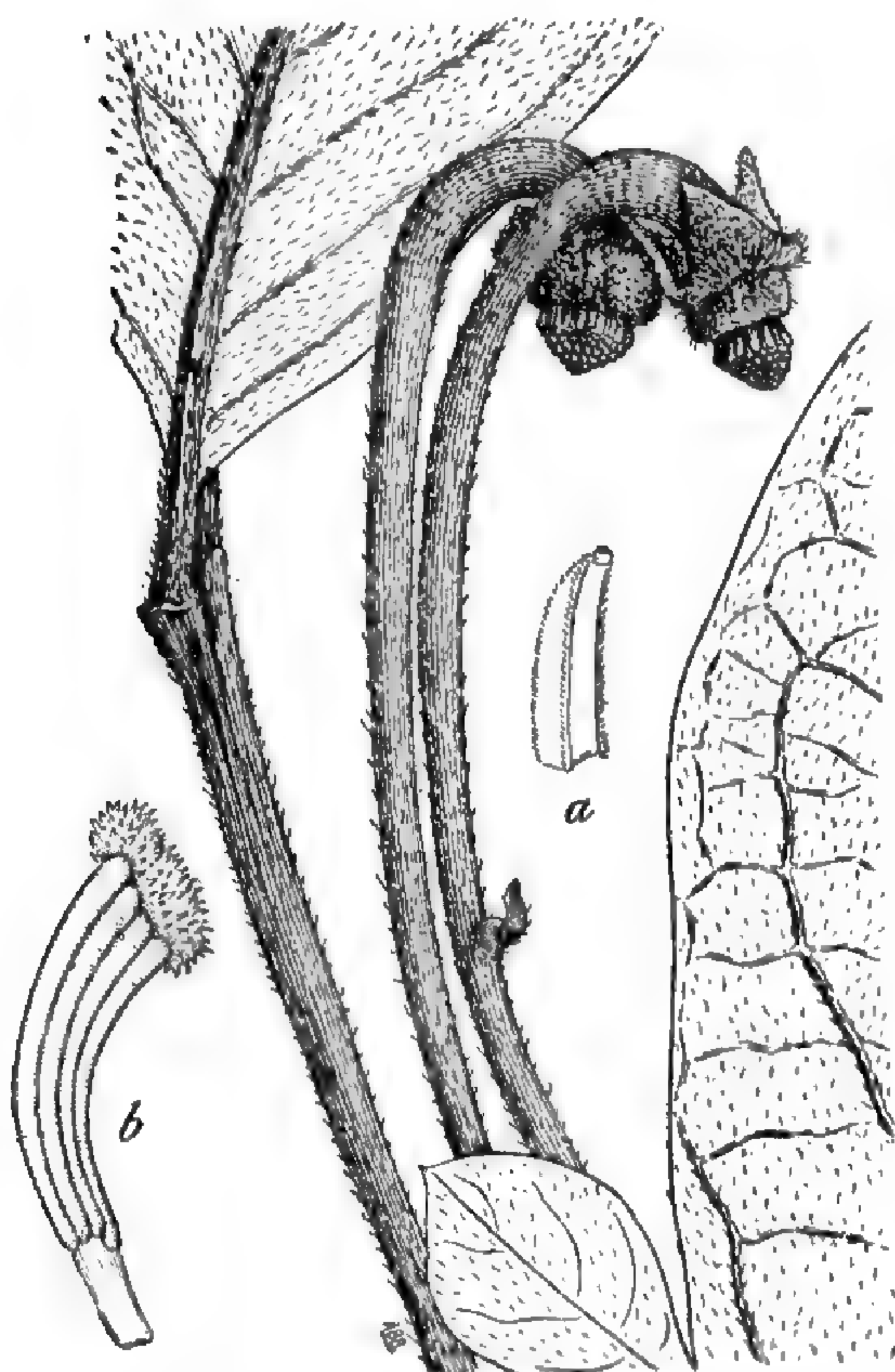


FIG. 46.—Geminate peduncles and other details of *Annona cornifolia*. *a*, Ovary; *b*, stamen. Main figure, scale 2; *a*, *b*, scale 13.

fulvous hairs; stamens pale yellow, 2 to 2.5 mm. long, with flat filaments scabrous with minute short appressed hairs, the connectives broadly expanded above the parallel sacs into an echinulate hood; carpels free, closely crowded into a cone-shaped gynoecium issuing from the center of the convex torus; ovaries prism-shaped, about 1 mm. long, 4-angled, slightly curved or straight, usually with a line of minute ascending hairs on each angle and a few similar hairs on the faces of the prism; styles about equal to the ovaries in length, fleshy, the outer ones on the periphery of the gynoecium swollen and subcylindrical, the inner ones quadrangular-prismatic, all of them becoming cemented together after pollination and very soon falling off, leaving the conoid mass of ovaries, the latter coalescing into a fleshy mass (syncarpium); fruit about the size of a horsechestnut or hen's egg, ovate-globose, obtuse, irregularly squamose and pubescent when immature, at length glabrate or glabrescent and reddish or orange-red, contain-

ing sweetish edible pulp. (PLATES 18, A, 20. FIGURE 46.)

Type material collected "in campis herbosis, prope urbem Sorocaba," Province of São Paulo, Brazil, December, 1819, by Augustin de St. Hilaire; also "in parte occidentali provinciae Minas Geraes dicta Certao de Rio de San Francisco, praecipue prope praedium S. Eligii et pagos Contendas et Formigas."

DISTRIBUTION: Brazil: Provinces of São Paulo and Minas Geraes, in grassy meadows.

SPECIMENS EXAMINED:

Brazil: "Campos près Sorocaba," *St. Hilaire* in 1828, with solitary flower borne at the apex of a simple stem (type collection, in Herb. De Candolle, attached tag numbered 1261); Cuyabá, *Endlich* 4b (Berlin Herb.); Ipanema, *Sellow* 1475 (Berlin Herb.); Rio Janeiro, *Glaziou* 12408; Minas Geraes, *Claussen* (fig. 46), with geminate erect peduncles and abruptly recurved flowers (in Herb. De Candolle, received from De Lessert, 1842); without definite locality, *Riedel* 2173 (Berlin Herb.).

LOCAL NAMES: Araticú mirim, Cuyabá (according to Endlich); Araticú do campo, southern Brazil (according to St. Hilaire).

Annona cornifolia St. Hil. is closely related to *A. spinescens* Mart. which grows in the low regions subject to inundations called "alagadisso," on the river San Francisco, near Joazeiro, in the Province of Bahia. The latter differs, however, in having spinescent branches and obtuse leaves, these glaucous rather than hoary white beneath, with the midrib and nerves of the same color as the rest of the under surface and less pilose, the nerves not so nearly parallel, and in having the flowers somewhat larger. It is also very closely related to *Annona nutans* R. E. Fries.

EXPLANATION OF PLATE 20.—Photograph of specimen in the De Candolle Herbarium (from type collection).

Annona nutans R. E. Fries.

Annona nutans R. E. Fries, Bull. Herb. Boiss. II. 4: 1171. 1904.

Annona cornifolia Morong, Ann. N. Y. Acad. 7: 47. 1892, not *A. cornifolia* St. Hil.

Annona spinescens var. *nutans* R. E. Fries, Vet. Akad. Handl. Stockholm 34^b: 43. 1900.

Section Gamopetalum. A low shrub with slender erect stems and short straight ascending branches, rufous-pubescent at first, at length glabrate, longitudinally striate and pale brown with small inconspicuous pale brown lenticels; typical leaves broadly ovate to obovate or elliptical, rounded or obtuse and mucronulate at the apex, 3 to 5 cm. long and 2.5 to 3.2 cm. broad, membranaceous or subcoriaceous, quite glabrous above, glaucous and glabrous beneath except along the midrib and lateral nerves, these usually pale rufous or fulvous, clothed when young with scant straight appressed minute reddish hairs, at length glabrate; lateral nerves about 10 on each side; petiole about 2 mm. long, grooved above, appressed-pilose like the midrib when young, at length glabrate; leaves at the base of the branches sometimes emarginate or retuse at the apex, obtuse, rounded, or sometimes acute at the base; peduncles solitary or geminate, extra-axillary, usually opposite a leaf, or subterminal by the abortion of the stem or branch beyond them, with a ferrugineous-tomentose scalelike bracteole at the base and a similar one near the middle, the latter sometimes reduced to a tuft of floccose hairs or even wanting; when geminate the pair sometimes subtended by a sessile suborbicular leaflike bract, straight or recurved near the extremity, 2.5 to 4 cm. long, at first clothed with appressed ferrugineous hairs, at length glabrate; calyx gamosepalous, with the triangular lobes terminating in linear points, clothed on the outside with ferrugineous silky hairs; corolla resembling that of *Annona cornifolia*, depressed-hemispherical in bud and about 1.5 cm. in diameter, finely ferrugineous-pubescent on the outside, bowl-shaped when expanded and about 2.3 cm. in diameter, gamopetalous, 6-lobed, composed of 3 narrow lobes corresponding to inner petals, alternating with 3 broad lobes overlapping their edges, pale yellow, spotted with purple on the inside; torus convex, glabrous between the bases of the stamens; stamens 1.8 to 2.2 mm. long, the filaments flat, the connectives broadly expanded above the parallel pollen sacs, echinulate, with short diaphanous sharp-pointed hairs; carpels closely crowded into a cone-shaped gynœcium, the ovaries prism-shaped, 4-angled, 0.9 to 1 mm. long, straight or slightly curved at the apex, glabrous or with a line of minute ascending hairs on each angle; styles about equal in length to the ovaries, fleshy, quadrangular-prismatic in shape and terminating in ovoid or spheroid stigmas, the outer ones

on the circumference of the gynœcium velvety or clothed with fine glandular hairs, the inner ones less hairy or papillose, all of them cemented into a solid mass and becoming detached from the ovaries after pollination; fruit said to be irregularly ovoid or spheroid and orange-colored when ripe; pulp edible but inferior in flavor to that of the chirimoya (*A. cherimola*). (PLATE 21. FIGURE 17, *a*, *c*, *d*, p. 13.)

Type in the Regnell Herbarium, Stockholm, collected at Villa Morra, Asuncion, Paraguay, December 17, 1893, by Prof. J. Daniel Anisits, of Budapest (no. 52).

DISTRIBUTION: Paraguay, Asuncion and Pilcomayo River (Morong); also on sandy plains near Itacurubi (Hassler).

SPECIMENS EXAMINED:

PARAGUAY: Asuncion, *Morong* 149 (U. S. Nat. Herb., Herb. Phila. Acad. Sci.). San Bernardino, *Endlich* 4 (Berlin Herb.); Cordillero de Altos, *Fiebrig* 552 (Berlin Herb.); Estrella, near Río Apá, on termite hills, *Fiebrig* 4324; near Concepcion, *Hassler* 7622; Gran Chaco, left shore Paraguay River, *T. Rojas* 2439. Lake Ypacarai, *Hassler* 3586.

LOCAL NAMES: Araticú ñu, Araticu mĩ (Paraguay).

This species is closely allied to *Annona cornifolia*, in which the flowers are either solitary or geminate and usually recurved or nodding. Its chief leaves, however, are glabrous or very nearly so, while in *A. cornifolia* they are normally pubescent or even densely tomentose, especially on the lower surface.

EXPLANATION OF PLATE 21.—Photograph of *Morong* 149 (U. S. Nat. Herb.), showing geminate peduncles at the right. *a*, Three ovaries detached from the gynœcium of the upper flower of the pair; *b*, mass of styles with outer circle of velvety stigmas detached from gynœcium of solitary nodding flower shown in the upper left-hand corner. Branches at natural size; *a*, *b*, scale 6.

Annona acutiflora Mart.

Annona acutiflora Mart. Fl. Bras. 13¹: 10. 1841.

Section Atractanthus. A shrub or small tree 4 to 6 meters high with crowded slender subflexuose branches; bark dark gray, bearing numerous lenticels, that of the young branchlets clothed with appressed ferrugineous hairs; bud scales densely ferrugineous-villous; leaves oblong, elliptical, obovate-oblong, or lanceolate-oblong, normally acuminate or cuspidate at the apex, acute or acutish at the base (8 to 11 lateral nerves on each side), distichous, rather closely crowded, 5 to 13 cm. long, 2.5 to 5 cm. broad, the younger ones thinly membranaceous and soft, the older ones membranaceous, deep green, pellucid-punctulate, glossy above and glabrous, clothed beneath when young with appressed ferrugineous hairs, especially along the midrib and lateral nerves, these becoming more or less glabrate at length; petioles 4 to 6 mm. long; broadly grooved above in continuation of the impressed midrib, ferrugineous-hirtellous when young, at length glabrescent; inflorescence extra-axillary, inclosed when young by two acute triangular concave ferrugineous-hirsute persistent bracts; peduncles in clusters of 2 or 3 or sometimes solitary by the abortion of the younger buds, usually decurved, issuing from the basal bracts and bearing one or two bracteoles, these together with the peduncles and the calyx clothed with a ferrugineous,

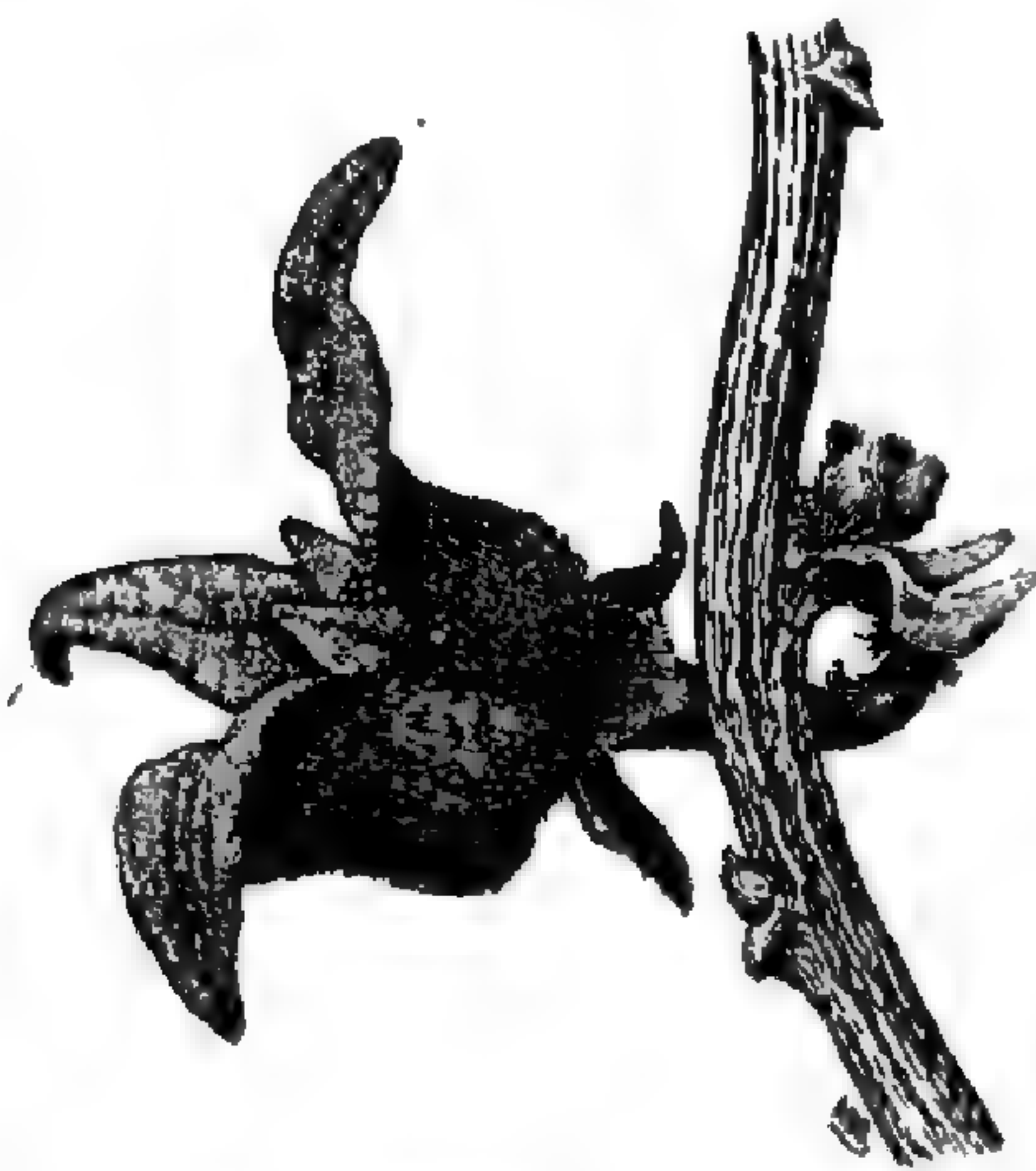


FIG. 47.—Flower of *Annona acutiflora*. From Riedel specimen as cited. Scale 2.

almost strigillose-villous indument; indument of the outer petals finer, subsericeous, of a lighter chestnut brown or cinnamon color; flower buds ovate-conical or fusiform, acuminate at the apex and sometimes triangular-pyramidal with the apex more or less curved; calyx 3-parted, the lobes scarcely 4 mm. long, broadly ovate-triangular, acute or acuminate; petals closely united in bud, broadly spreading after anthesis, fleshy but thin, the outer ones united at the base (gamopetalous), 12 to 16 mm. long, concave at the base around the essential parts and narrowed into a long-acuminate apex, white within with a light red or purplish spot at the base; inner petals about half as long as the outer, ovate, acute, excavated at the base and more connivent above the essential parts at first, at length opening widely, white with a purplish spot at the base; torus raised, conoid, minutely puberulent between the bases of the stamens and bordered about the base with stiff ferrugineous hairs; stamens numerous, yellow (light brown or straw-colored when dry), with short flat filaments and the connective expanded above the pollen sacs into a swollen, brown, minutely papillose or velvety head; carpels numerous, closely crowded into a conoid gynœcium borne on the apex torus; ovaries densely pilose with ascending rufous or fulvous subulate hairs, linear-oblong, tipped with short prism-shaped styles terminating in depressed-capitate velvety stigmas with their surface covered with minute acutish papillose cells; young fruit ovate-conoid, rufous or fulvous-pubescent and tuberculate or verrucose from the swelling of the carpels composing it; ripe fruit not observed, but in all probability similar to that of *A. cherimola* in shape and appearance. (PLATE 22. FIGURES 21, p. 16; 47, 48.)

Type material in the Royal Botanical Museum at Munich, collected in the Province of Rio de Janeiro, Brazil; near Tijuca, by Schott; near Campinho, by Martius; also near Lagoa de Freitas (not far from the site of the present Botanical Gardens), by Luschnath.

DISTRIBUTION: Province of Rio de Janeiro, Brazil, growing in moist situations in forests and groves called "caa-apoam," and on sandy stretches along the coast called "restinga."

SPECIMENS EXAMINED:

BRAZIL: Province of Rio Janeiro: "In arenosis Rastinga dictis pr. Tijuca et Taipú, April, 1833, *Riedel* 1306 (U. S. Nat. Herb., no. 703459, ex Herb. Hort. Bot. Petrop.); without definite locality, *Riedel* (U. S. Nat. Herb., no. 703460, ex Herb. Hort. Bot. Petrop.); Rio Janeiro, *Gaudichaud* 802 (Herb. De Candolle, Berlin Herb.); *Glaziou* 18841 (Berlin Herb.); without definite locality, *Casaretto* (Herb. De Candolle ex Herb. Reg. Turini, 1857); without definite locality, *Sellow* 1256 (Berlin Herb.).

EXPLANATION OF PLATE 22.—Photograph of specimen in Herb. De Candolle, collected by Casaretto, showing unopened flower and leaves. Natural size.

Annona lutescens Safford, sp. nov.

Section Atta. A small tree with spreading branches; new branchlets densely fulvous-pubescent, at length glabrescent; leaves ovate to elliptical-oblong, acute



FIG. 48.—Immature fruit and stamens of *Annona acutiflora*. a, Stamens; b, flower from which petals, stamens, and styles have fallen; c, young fruit. a, Scale 16; b, c, scale 2.

or acuminate (the lower ones sometimes retuse), usually rounded at the base, conduplicate, membranaceous, punctate, 12 to 15 cm. long and 6 to 7.5 cm. broad,

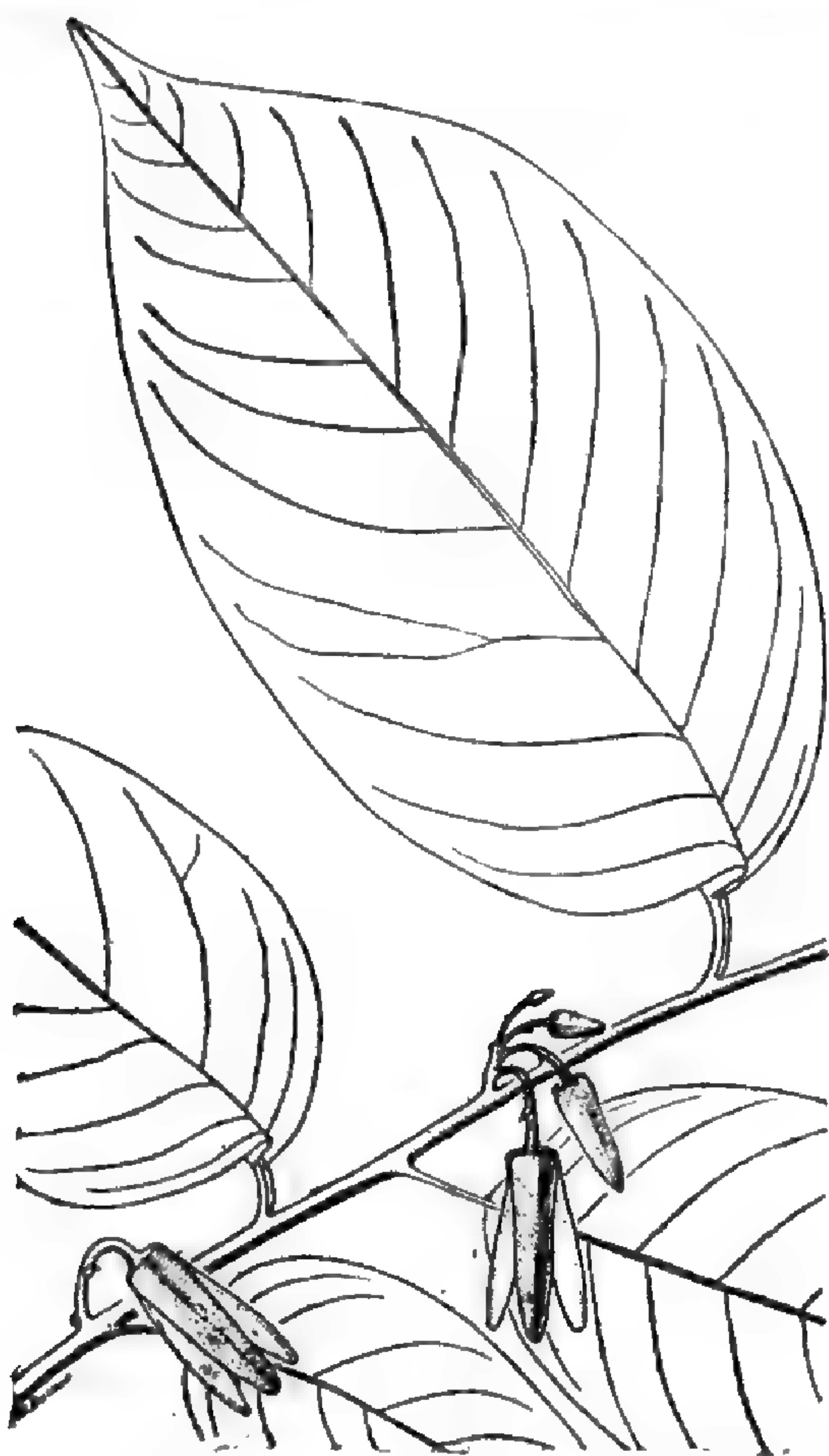


FIG. 49.—Inflorescence and leaves of *Annona lutescens*. From Goldman 1007, as cited. Scale $\frac{1}{2}$.

at first densely fulvous-pubescent, at length glabrate except along the mid-rib and lateral nerves (10 to 14 on each side), these sparsely and persistently pubescent, as seen under the lens; petiole 10 to 14 mm. long, grooved above, the grooves filled with dense fulvous pubescence, at length glabrescent; flowers resembling those of *Annona reticulata* L. and *A. squamosa* L., the young buds obpyriform, fulvous-pubescent; inflorescence extra-axillary, often opposite a leaf, peduncles in clusters of 3 or 4, sometimes solitary, recurved or nodding, at first fulvous-pubescent, at length glabrate or sparsely appressed-pubescent, usually with an ovate acute pubescent bracteele at or below the middle and a second one at the base; calyx 3-parted, calyx lobes ovate-acuminate; outer petals linear-oblong, 22 to 24 mm. long, concave at the base, keeled within or triquetrous above; inner petals minute, squamiform, scarcely exceeding the stamens in length, ovate, acute, usually with

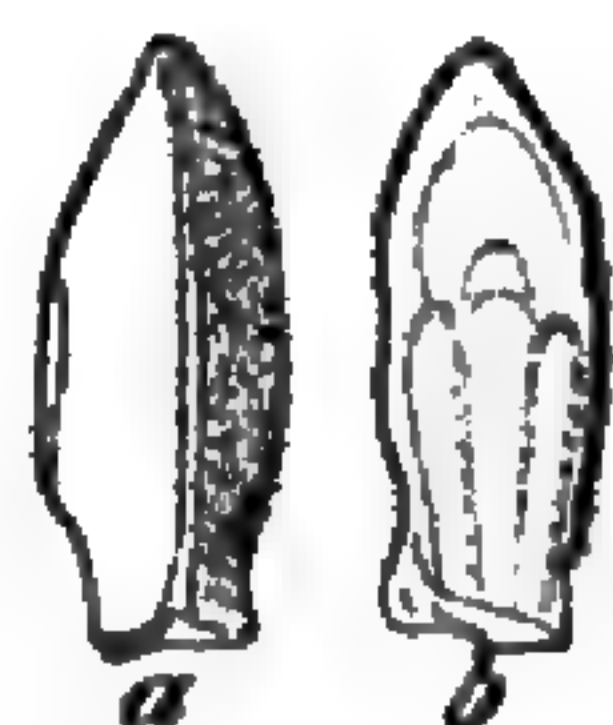


FIG. 50.—Inner petals of *Annona lutescens*. a, Outside face; b, inner face, with imprint of stamens. Scale 10.

impress of stamen within, sericeous and keeled on the outside; stamens numerous, short and broad, about 1.1 mm. long, with the brown connective expanded above the pale yellow pollen sacs into a broad truncate head; pollen grains in tetrads, yellowish white or cream-colored, arranged in 2 columns in each pollen sac; gynæcium conoid,

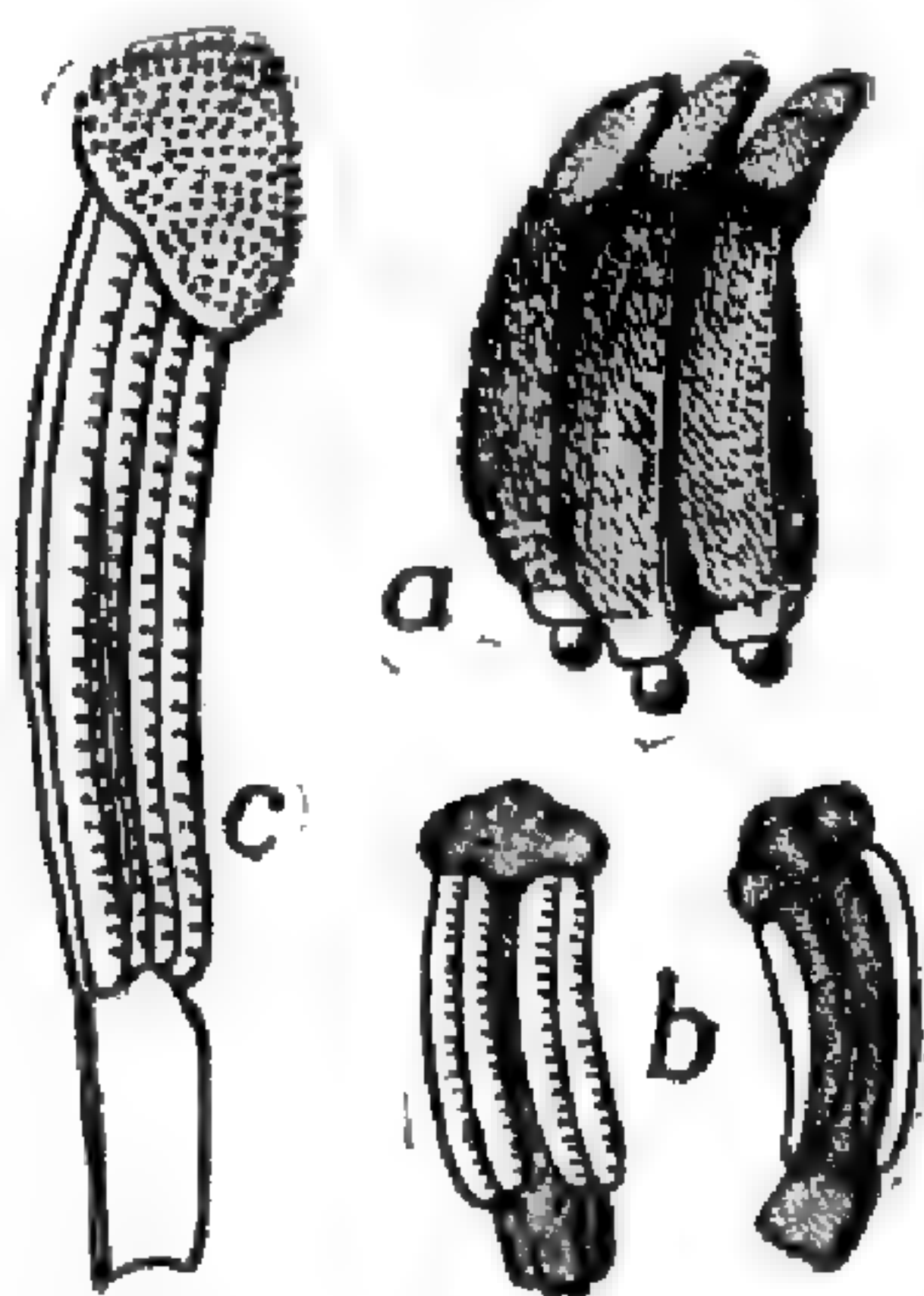


FIG. 51.—Floral details of *Annona lutescens* and *A. glabra*. a, Carpels with solitary ovules at base, and b, stamens of *A. lutescens*; c, stamen of *A. glabra*. All scale 13.

composed of numerous closely crowded appressed carpels 1.1 to 1.3 mm. long; ovaries clothed with pale brown ascending hairs, with solitary basal ovule and terminal oblong or ovate fleshy glandular style similar to the styles of *A. reticulata* and *A. squamosa*, the lower portion of the ovaries more closely cemented together than in the typical forms of *A. squamosa* and *A. cherimola*, the styles constricted in the base and falling off in a mass soon after pollination; fruit broadly heart-shaped or conoid, 8 or 9 cm. in diameter, yellow when ripe, rounded at the apex, resembling that of *A. reticulata*, but with the surface quite

smooth and the areoles only faintly indicated, as in *A. glabra*; seeds dark brown, smooth and glossy, resembling those of *A. reticulata*; pulp sweetish but

insipid, adhering to the seeds, tallow-like with minute hard granules. (PLATE 23. FIGURES 49, 50, 51, *a*, 52, *a*.)

Type in the U. S. National Herbarium, no. 850044, collected near Cahabon, Alta Verapaz, Guatemala, April 26, 1904, by O. F. Cook (no. 93).

DISTRIBUTION: Northern Guatemala and southern Mexico.

SPECIMENS EXAMINED:

GUATEMALA: Type specimen as cited with field photograph (U. S. Dept. Agr. Bur. Plant Ind. no. 7247.)

MEXICO: Chiapa, State of Chiapas, *Goldman* 1007.

LOCAL NAME: Anona amarilla (Alta Verapaz, Guatemala).

Annona lutescens is closely allied to *A. reticulata* L., from which it differs in its broader leaves (fig. 52) and its yellow fruit. *Annona reticulata*, commonly known as "bullock's heart," has long, narrow leaves (therefore figured by Plumier¹ as "*Annona foliis lanceolatis*") and its fruit turns red, at least on the sunny side, when mature. The present species, according to Mr. Cook, is recognized as distinct from the common *A. reticulata* by the natives of Alta Verapaz, who call it "anona amarilla." In general appearance the fruit resembles very closely the common alligator apple of tropical mangrove swamps (*A. glabra* L.), but the latter may easily be distinguished by its large flowers with 6 ovate valvate petals, its laurel-like leaves, its edible fruit, and its yellow or tan-colored seeds. The difference in the stamens of the two species may be seen in figure 51, which also shows three carpels of *A. lutescens*, with their hairy ovaries, basal solitary ovules, and terminal fleshy styles, these velvety like chamois skin on the surface, as seen under the microscope, instead of muriculate, as in the much larger stamen of *A. glabra*. The flowers of the present species are very similar to those of *A. reticulata* L., yet this is also true of the flowers of *A. squamosa* L. The three form a subdivision of the section Atta and are very closely allied, but undoubtedly distinct, as in the case of the two chirimoyas, *A. cherimola* Mill. and *A. longiflora* S. Wats.

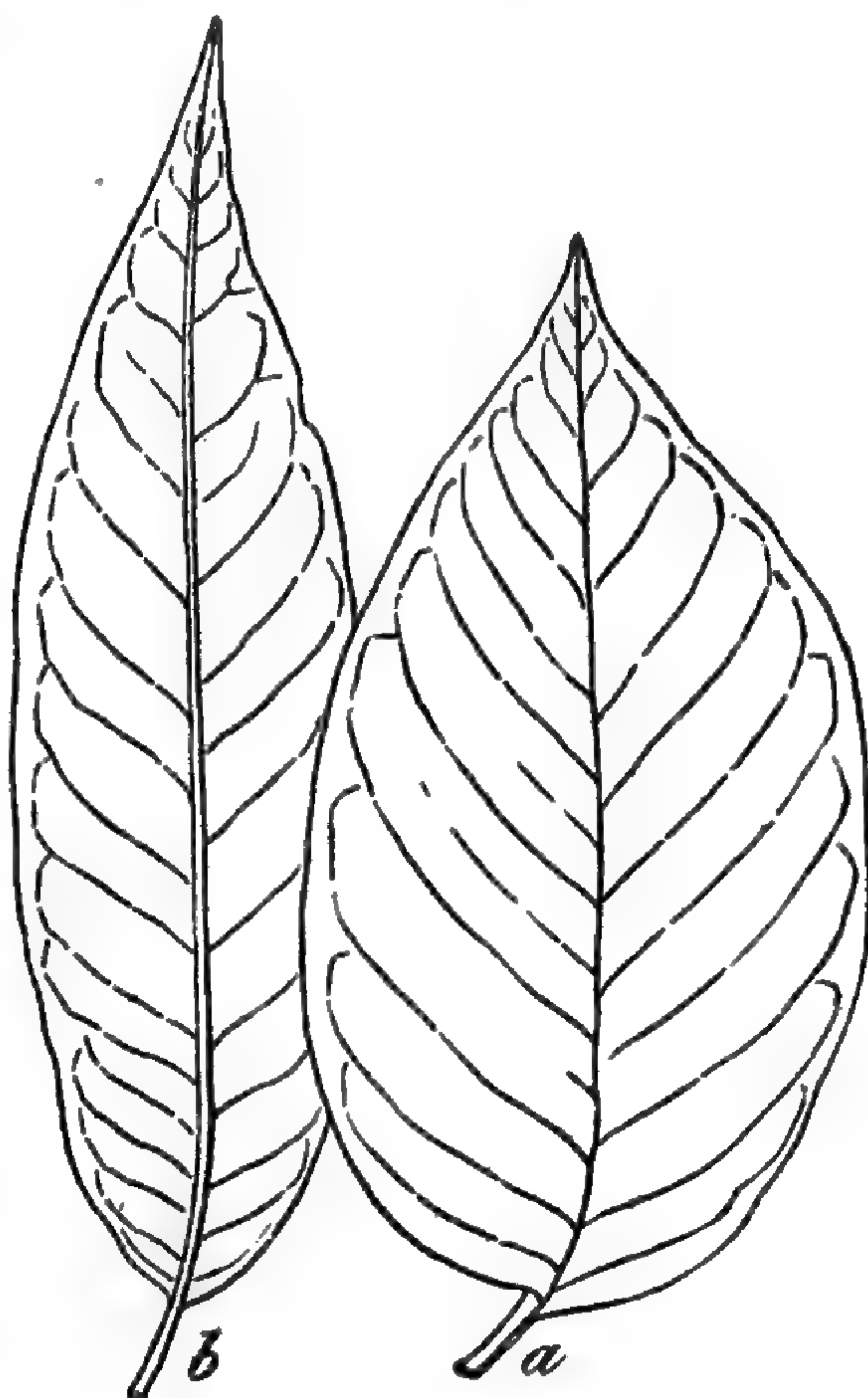


FIG. 52.—(*a*) Leaf of *Annona lutescens* and (*b*) one of *A. reticulata*. Scale $\frac{1}{2}$.

EXPLANATION OF PLATE 23.—From a field photograph of type material, showing fruit, seeds, extra-axillary clusters of unopened nodding flowers, and retuse lower leaf. Natural size.

Annona palmeri Safford, sp. nov.

Section Atta. A shrub 2 or 3 meters high, with 2-ranked approximate thin membranaceous leaves resembling those of *A. squamosa* in shape, and with very small obtuse-petaled flowers on long slender peduncles; branches very slender, at

¹ Nov. Pl. Amer. pl. 143. f. 2. 1755.

first sparsely appressed-pilose, soon glabrate, reddish brown, bearing numerous light-brown lenticels; petioles 5 or 6 mm. long, broadly channeled above, sparsely pubescent at first, soon glabrescent; blades oblong-lanceolate to ovate, the lowermost on the flowering branches small, elliptical and sometimes retuse, the uppermost longest, and relatively narrowest, 10 cm. long and 2.5 cm. broad, with 7 to 10 nerves on each side, those lower down 5 to 6 cm. long and 2.8 to 3 cm. broad, usually obtuse or obtusely acuminate but sometimes acutish at the apex, rounded or cuneate and sometimes slightly unequal at the base, above at first sparsely pubescent but soon quite glabrous or with a few whitish fine hairs along the impressed midrib, beneath at first sparsely appressed-pilose but soon glabrate or nearly so, the pale rufous midrib and lateral nerves prominent; peduncles extra-axillary, solitary, 1-flowered, 10 to 15 mm. long, sparsely



FIG. 53.—*Annona palmeri*. Leaves, flower, and fruit. Scale $\frac{1}{2}$. From type specimen.

pubescent, with a minute pubescent bracteole at about the middle and one at the base, persistently slender; flowers small, pyriform or obovoid in bud; calyx lobes broadly ovate or triangular, pubescent; outer petals obovate-oblong, 8 to 8.5 mm. long by 4 mm. broad, rounded at the apex, very thick, valvate, triquetrous, excavated at the base to receive the essential parts, puberulent on the outside; inner petals small, scarcely exceeding a stamen in length, perfectly formed (not aborted), elliptical or obovate, rounded at the apex, velvety on the outside, about 1 mm. long and 0.5 mm. broad; receptacle convex; stamens numerous, 1 mm. long with the two parallel straw-colored pollen sacs capped by the expanded brown velvety terminal head of the connective; carpels distinct, forming a depressed-pyramidal gynoecium; fruit subglobose or depressed-conoid, 2 to 2.5 cm. in diameter, composed of 12 to 20 carpels, these cohering in a solid mass, individually somewhat gibbous on the surface and marked with a terminal

point but not produced into a beak or tubercle; pulp scanty; seeds relatively large, unsymmetrically obovate, rounded at the apex and bearing a caruncle at the base, 8 to 10 mm. long and 7 mm. broad; testa thin, golden brown, or buff-colored, somewhat wrinkled by the rumination of the inclosed endosperm. (PLATE 24. FIGURES 53, 54.)

Type in the U. S. National Herbarium, no. 266450, collected near Acapulco, Mexico, in November, 1894, by Dr. Edward Palmer (no. 85). "A shrub 5 to 10 feet high with dull white flowers, growing in the river bottom near Acapulco."

DISTRIBUTION: Known only from the type locality.

SPECIMENS EXAMINED:

MEXICO: From the type collection in the U. S. National Herbarium and in the Gray Herbarium.

LOCAL NAME: Anonilla, or "dwarf anona" (Acapulco).

This species has very much the same habit of growth as *A. globiflora* Schlecht., the dwarf anona of eastern Mexico, but the head of the connective is broader than the two pollen sacs and the long, solitary peduncle is very different from that of *A. globiflora*. On account of the broad connective and the perfectly formed inner petals, the writer provisionally assigns *A. palmeri* to the section Atta, which includes *A. squamosa* and its allies. It has, however, the habit of certain species of Rollinia, and its short, round-pointed, thick petals, together with its Rollinia-like seeds may indicate that it is a link between the genera Annona and Rollinia.

EXPLANATION OF PLATE 24.—Photograph of the type in the U. S. National Herbarium, showing a single flower, a dry fruit, and two seeds. Natural size.

Annona longiflora S. Wats.

Anona longiflora S. Wats. Proc. Amer. Acad. 22:397. 1887.

Section Atta. A shrub 3 to 10 feet high, the young branches, peduncles, and petioles densely soft-pubescent; leaves elliptical to ovate or obovate-elliptical, usually rounded but sometimes acute at the base, rounded or obtuse and often minutely apiculate or mucronulate at the apex, bright green above, glaucous green beneath (when dry), 5 to 14 cm. long by 3.5 to 8 cm. broad, densely and softly pubescent when fresh, at length becoming nearly glabrous above and glabrescent or sparsely pubescent beneath except on the midrib and lateral nerves; flowers

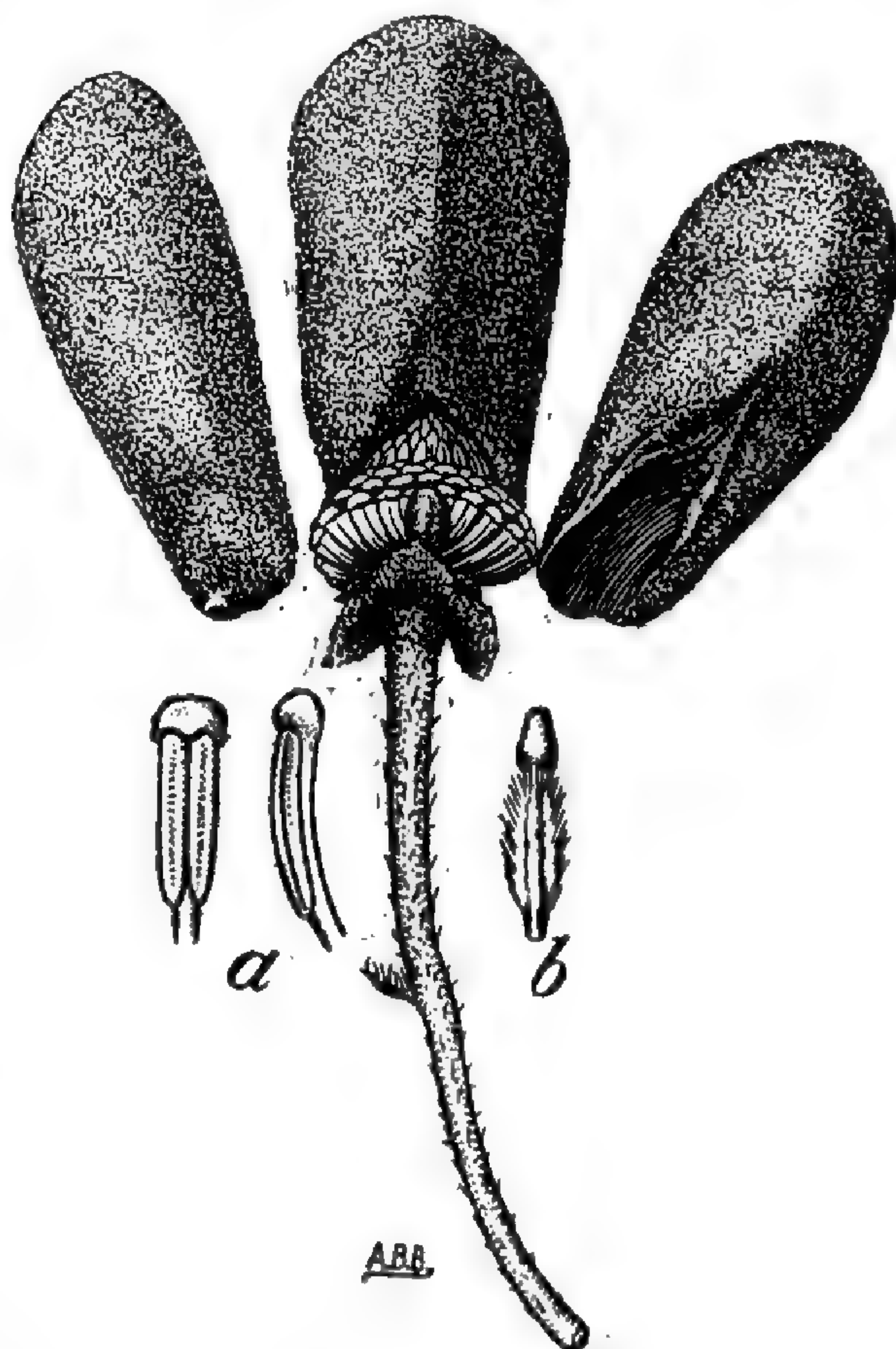


FIG. 54.—Flower of *Annona palmeri*. a, Stamens; b, carpel. From type specimen. Flower, scale 4; a, b, scale 13.

resembling those of *A. cherimola* but larger, short-peduncled, pubescent, densely so at the base; calyx divisions deltoid-ovate, 5 mm. long, clothed on the outside with fine long soft hairs; outer petals linear-oblong or oblong-lanceolate, 4 to 5 cm. long and 7 to 9 cm. broad, coriaceous, swollen at the base and concave about the essential parts, whitish or cream-colored with a dark purple or blackish spot at the base; inner petals minute (sometimes wanting), finely pubescent, ovate, obtuse, 2 to 3 mm. long; torus hemispherical, clothed with fine straight hairs between the filaments; stamens 2.2 to 2.7 mm. long, with the connective terminating in an expanded cap above the parallel pollen sacs, its surface finely granular; carpels 2.5 to 3 mm. long, the ovaries 1.5 to 2 mm. long, covered with rufous ascending hairs, the styles 1 to 1.5 mm. long, minutely puberulent (under the microscope), the stigmatic extremity tapering to a point; fruit conoid or globose-ovate, its surface either reticulated with flat areoles or bearing protuberances like those on certain forms of the fruit of *Annona cherimola* L.; seeds coffee-colored, obovoid, cuneate, truncate or obpyramidal, about 15 mm. long and 10 mm. broad, with a smooth thick

testa, resembling the nuts of *Pinus cembra* but much larger, without a pronounced basal caruncle. (PLATE 25. FIGURES 55, 56.)

Type in the Gray Herbarium, collected at Rio Blanco, near Guadalajara, State of Jalisco, Mexico, June, 1886, by Dr. Edward Palmer (no. 55).

DISTRIBUTION: State of Jalisco, Mexico.

SPECIMENS EXAMINED:

MEXICO: State of Jalisco, Rio Blanco, *Palmer* 55, type (with smooth fruit) in Gray Herb., duplicate (with umbonate fruit) in U. S. Nat. Herb., no. 2572; bluffs of the Rio Grande de Santiago, *Pringle* 2480; bluffs of the Barranca de Guadalajara, "a shrub 5 to 10 feet high," *Pringle* 9681 (with mature seeds); on the road between Bolaños and Guadalajara, *Rose* 3058; near Tequila, *Rose & Hough* 4741.

LOCAL NAMES: Chirimoya de la barranca (Guadalajara, Jalisco); Chirimoya cimarrona (Tequila, Jalisco).

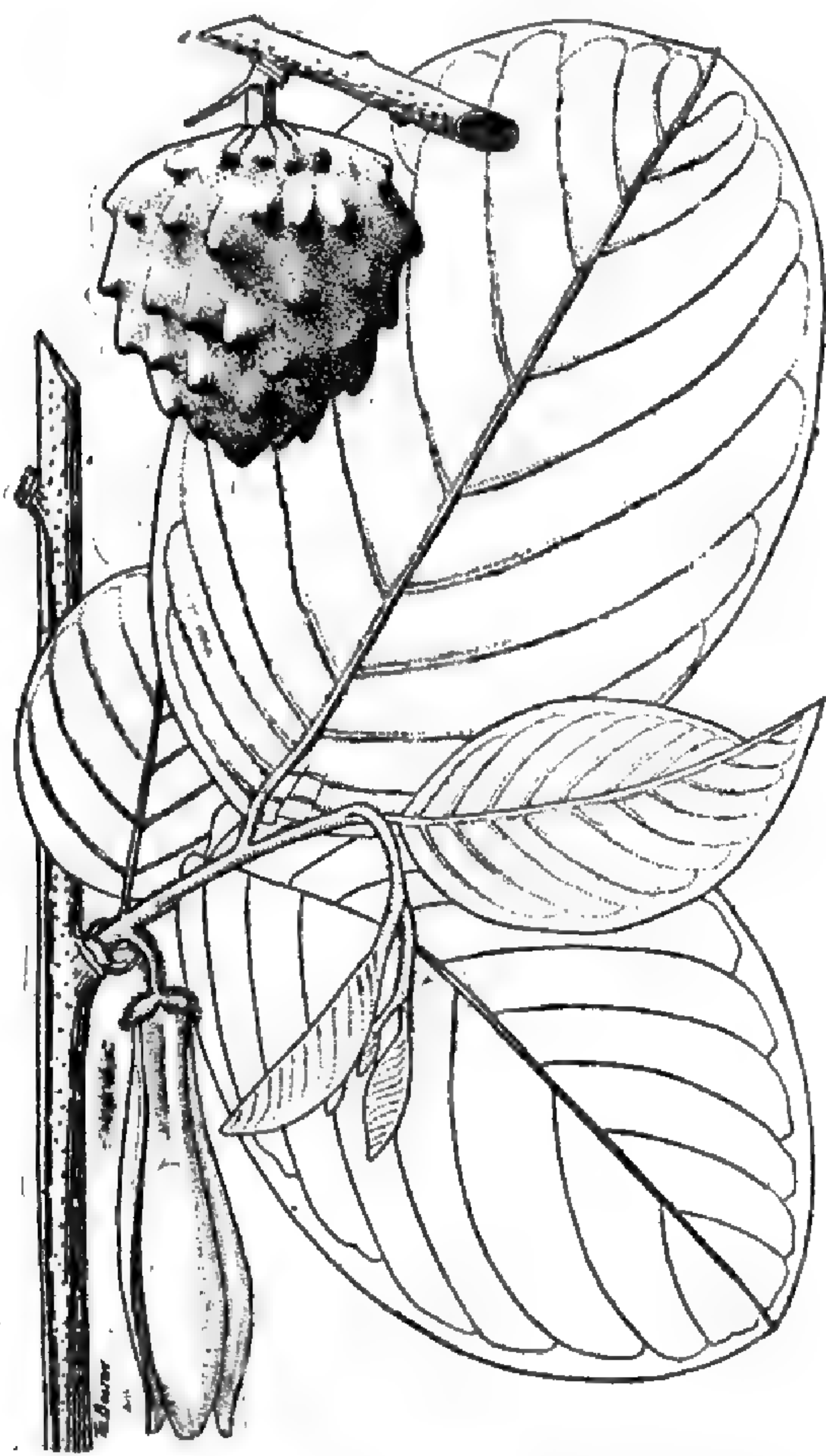


FIG. 55.—*Annona longiflora*. Leaves, flower, and fruit. Scale $\frac{1}{2}$. From type material in U. S. National Museum.

Annona longiflora is very closely allied to *A. cherimola* Mill., but is easily distinguished from that species by its longer flowers with shorter peduncles and loose floccose hairs about the base of the corolla (fig. 56), by its leaves, which are at length glabrate instead of persistently pubescent between the lateral nerves, and by its peculiar seeds, which resemble large pine nuts rather than the seeds of an *Annona*. It was originally described as a shrub 3 feet high; but specimens collected from the type locality by Mr. C. G. Pringle grew to the height of 10 feet. About the base of the young branchlets, where they issue from the bud, is a collar of soft plushlike pubescence. As in many other species of the Annonaceae, the lowermost leaves of the flowering branchlets are smaller than the succeeding ones, in this species often suborbicular; the peduncles are extra-axillary, usually issuing from near the base of a branchlet and often opposite a small suborbicular leaf. The stamens and carpels are considerably larger than those of *A. cherimola*; the outer petals are strap-shaped rather than triquetrous, as in the latter species,

though they usually have a raised median line or keel on the inner surface. The minute inner petals scarcely exceed the stamens in length and might easily escape observation.

In the type collection the fruits were immature. They were of two distinct forms analogous to the umbonate and smooth forms of *Annona cherimola* and of *A. diversifolia*. That in the Gray Herbarium is globose-ovate and "covered with flat reticulations," as described by Doctor Watson. In the National Herbarium, however, the fruit of the type collection is conoid and bears numerous

umbonate protuberances, as shown in figure 55. Mature seeds collected by Pringle in the Barranca of Guadalajara in 1902 are very different from those of *Annona cherimola*, being truncate or obpyramidal in form without a caruncle at the base, and having the testa quite smooth and nutlike, thicker than those of the common edible custard apples and similar in texture to the seeds of *Annona diversifolia*. They differ so much from those of all other species of *Annona* that they alone would be sufficient to identify this species.

According to Doctor Palmer's notes, the fruit is edible either raw or cooked. A sweetmeat is made by boiling it with sugar, together with the fruit of the *tejocote* (*Crataegus mexicana*).

EXPLANATION OF PLATE 25.—From a photograph of a specimen collected by Rose and Hough in the Barranca of Guadalajara, State of Jalisco, Mexico (no. 4827), together with seeds from the same locality collected by Pringle in 1902. Natural size.

***Annona macrophyllata* Donn. Smith.**

Annona macrophyllata Donn. Smith, Bot. Gaz. 49: 453. 1910.

Section Ilama. A shrub 3 or 4 meters high with pale green or glaucous foliage; leaves small, subsessile, membranaceous, glabrous, oblong-elliptical or obovate-oblong, 4 to 5.5 cm. long and 2 to 3 cm. broad, rounded or at least obtuse at the apex and rounded or retuse at the base, with 7 to 13 prominent lateral nerves on each side the midrib, minutely reticulate and punctulate with pellucid dots between the nerves; petioles 2 to 3 mm. long; peduncles solitary, 1-flowered, glabrous, 17 to 27 mm. long, issuing from a pair of leaflike cordate-orbicular bracts, or prophylla, at the base of short branchlets and bearing near the middle a minute lanceolate bracteole tipped with a floccose tuft of silky hairs; basal bracts subopposite, unequal, 16 to 24 mm. in diameter, at first clothed with ferrugineous-silky hairs, at length glabrescent, but ciliate along the margin and at the base; calyx lobes ovate, 3 to 4 mm. long, ferrugineous-villous on the outside; outer petals oblong or ovate-oblong, obtuse or rounded at the apex, thick and fleshy, glabrescent on the outside, valvate, excavated at the base to include the essential parts, cinereous-velvety within, 21 mm. long and 8 mm. broad; inner petals minute, 2.5 mm. long and 1 mm. broad, pubescent on the outside and bearing the rudiments of two pollen sacs; receptacle convex or hemispherical, clothed with whitish silky hairs between the bases of the filaments; stamens numerous, crowded, 2.5 mm. long, puberulent, with the connective expanding above the pollen sacs into a broad puberulent head; carpels 2 mm. long, the ovary clothed with short whitish hairs and bearing a tapering amber-colored glandular style; fruit not observed. (PLATE 26.)

Type in the U. S. National Herbarium, no. 57958, ex Herb. Donnell Smith, collected near Viscal, 13 miles north of Guatemala City, 1,110 meters elevation, June 5, 1909, by Charles C. Deam (no. 6191).

DISTRIBUTION: Guatemala and southern Mexico.

SPECIMENS EXAMINED:

MEXICO: Tapachula, State of Chiapas, May 7, 1902, Cook & Collins (photograph no. 4005, U. S. Dept. Agr. Bur. Plant Ind.).

GUATEMALA: Type specimen as cited.

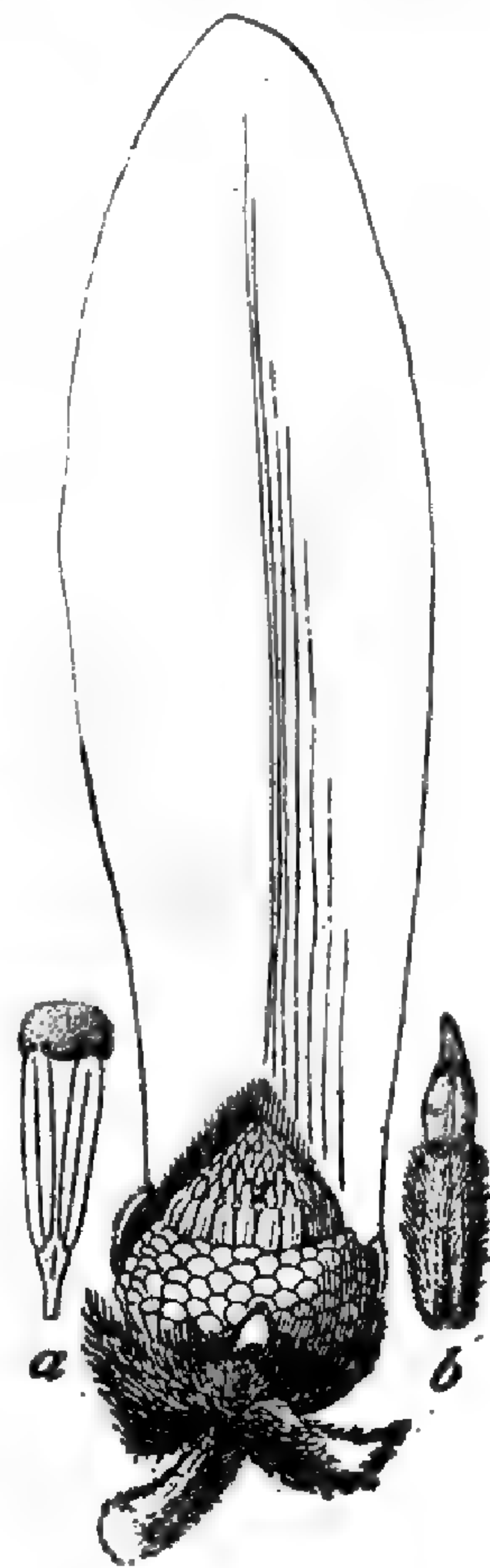


FIG. 56.—Flower of *Annona longiflora*. a, Stamen; b, carpel. Flower, scale 3; a, b, scale 13.

Annona macrophyllata Donn. Smith is very closely allied to *A. diversifolia* Safford,¹ the "ilama" of Colima and Acapulco (figs. 27, 28, pp. 19, 20); but it differs in its shorter-petioled, smaller leaves, its oblong flowers and thicker peduncles, and its persistently ciliate, smaller bracts or prophylla.

Mr. O. F. Cook, of the Bureau of Plant Industry, U. S. Department of Agriculture, while on a mission of agricultural exploration, found this species near Tapachula, in the State of Chiapas, southern Mexico, in 1902, 7 years before the type specimen described by Capt. Donnell Smith was collected, and describes it in his field notes as follows:

"May 8, 1902. There is an Anona with glaucous leaves not infrequent at Tapachula, State of Chiapas. The smaller leaves or bracts are, like the bud scales, clothed on the back with long, silky, brown hairs. The mature petals are greenish at the base and become yellow in the distal half; along the margins and on the inside they are tinged and mottled with pink and deep red like the flesh of a peach. The clustered apices [connective heads] of the stamens are dull pinkish when fresh. The pollen lies in the anthers in chains [of tetrads], two chains in each of the two sacs. The stigmas have a joint or collar at the base and are bathed in a transparent fluid [at the time of pollination]. The petals turn dark brown within a few minutes after being placed in alcohol."

EXPLANATION OF PLATE 26.—Photograph taken in the field, at Tapachula, State of Chiapas, Mexico, near the Guatemala boundary, May 7, 1902, by Mr. Guy N. Collins.

Annona bullata A. Rich.

Annona bullata A. Rich. (in part) Ess. Fl. Cuba 31. 1845. Same in Sagra, Hist. Cuba 10:13. pl. 5. 1845.

FIG. 57.—Flower of *Annona bullata*. One petal removed. Scale 4.

Section Saxigena. A shrub or tree; new branches ferrugineous-subtomentose, at length glabrate; older branches glabrous, grayish or brownish, longitudinally plicate-striate and bearing numerous inconspicuous brownish lenticels; leaves ovate to oblong-elliptical, acutish, obtuse or rounded, occasionally retuse, often mucronulate at the apex, obtuse or rounded at the base, 5 to 9 cm. long, 2.5 to 4.5 cm. broad, upper surface with the midrib, nerves (12 to 14 on each side), and reticulating veins impressed, the small areoles formed by the last having a gibbous or bullate appearance, when young pubescent with short grayish or pale rufous hairs, at length glabrescent; under surface with the venation elevated and ferrugineous-pubescent, the ultimate areoles concave, olive green or grayish; petiole 4 to 6 mm. long, ferrugineous or fulvous-tomentose, grooved above in continuation of the impressed midrib; peduncles solitary, extra-axillary, often issuing from very near the base of a new branchlet opposite a small leaf (not "subterminal" as described, in the specimens examined by me) at least 3 times the length of the petioles (15 to 18 mm. long), bibracteolate, the bracteoles squamæform, ferrugineous or rufous-tomentose, alternate, one at the base, the other near the middle of the peduncle; flower buds oblong-pyramidal and sub-acute; flowers yellowish green when fresh, long and slender, resembling those of *A. cherimola* but with the outer linear petals when mature narrower and not

¹ Journ. Washington Acad. Sci. 2: 118. 1912.

triquetrous or keeled within along the distal portion, concave at the base to receive the essential parts, 25 to 30 mm. long and 4 mm. broad, rufous or fulvous-tomentose on the outside, grayish tomentulose within and pale rufous-tomentose at the base; inner petals minute, not exceeding the stamens in length, rufous-tomentulose; calyx gamosepalous, small, 3-parted, densely ferrugineous-tomentose on the outside, the lobes broadly triangular and obtusely acuminate or cuspidate at the apex; stamens numerous, 1.2 to 1.4 mm. long, covering the lower half of the ovoid torus, appressed, subarcuate; filaments broad and flat, 0.45 mm. long and 0.25 mm. broad; pollen sacs linear, 0.8 mm. long (mature specimens observed), pale straw-colored, parallel and almost contiguous; connective a continuation of the basal filament, broad and flat, terminating in a slightly swollen obtuse velvety straw-colored apex above the pollen sacs but not expanding beyond them as in *A. cherimola* and its close allies; carpels numerous, crowded, distinct, borne on the upper half of the torus, very similar to those of *A. cherimola* and its allies; ovaries about 0.8 mm. long, clothed with long appressed whitish sericeous hairs; styles ovoid or oblong, glandular-velvety with a median groove on the ventral side; fruit spheroid-cordiform or oblate, small, its component carpels terminating in pointed protuberances, very much as in umbonate forms of cherimoya fruit, and clothed with a pale rufous or fulvous velvety indument; seeds relatively large, ovoid or oblong, 10 to 14 mm. long, 7 to 9 broad, more or less triquetrous, with a smooth glossy golden brown testa more or less irregularly pitted and a ruminant endosperm as in allied species. (PLATES 27, 28. FIGURES 30, 32, pp. 20, 21; 57, 58.)

Type material in the Delessert Herbarium, collected at Arcos de Canasí, on the north coast of Cuba, between Habana and Matanzas.

DISTRIBUTION: Island of Cuba, Provinces of La Habana, Matanzas, and Santa Clara.

SPECIMENS EXAMINED:

CUBA: Province of Havana, (definite locality not stated,) 1831, *Ramon de la Sagra* 556 (type collection), in Herb. De Candolle, ex Herb. Delessert; Province of Matanzas, without definite locality, 1865, *Wright* 327 (U. S. Nat. Herb.); Province of Santa Clara, palm barren, Santa Clara, 1912, *Britton & Cowell* 13329 (U. S. Nat. Herb.).

The specimens collected by Ramon de la Sagra included only immature flowers ("in alabastro unico a me observato." A. Richard). These were nearly all detached from the branches, from which the leaves had also separated, as seen in the specimens in the De Candolle Herbarium as cited. The leaves agree in shape and texture with the specimens collected by Wright in the Province of Matanzas, here figured, except that several of the latter are more distinctly mucronulate than any of the leaves of the type. The normally shaped ones, growing on the upper portions of the branches, shown in figure 30 (p. 20), are distinctly oblong, and not suborbicular as in the closely allied *A. crassivenia* of Almacigos (fig. 31, p. 20), which has hitherto been confused with this species. From the camera lucida drawings of the essential parts (fig. 58) it will be seen that the mature stamens of *Annona bullata* are broader, thinner, and flatter, the hairy carpels more slender, and the (ovoid) terminal

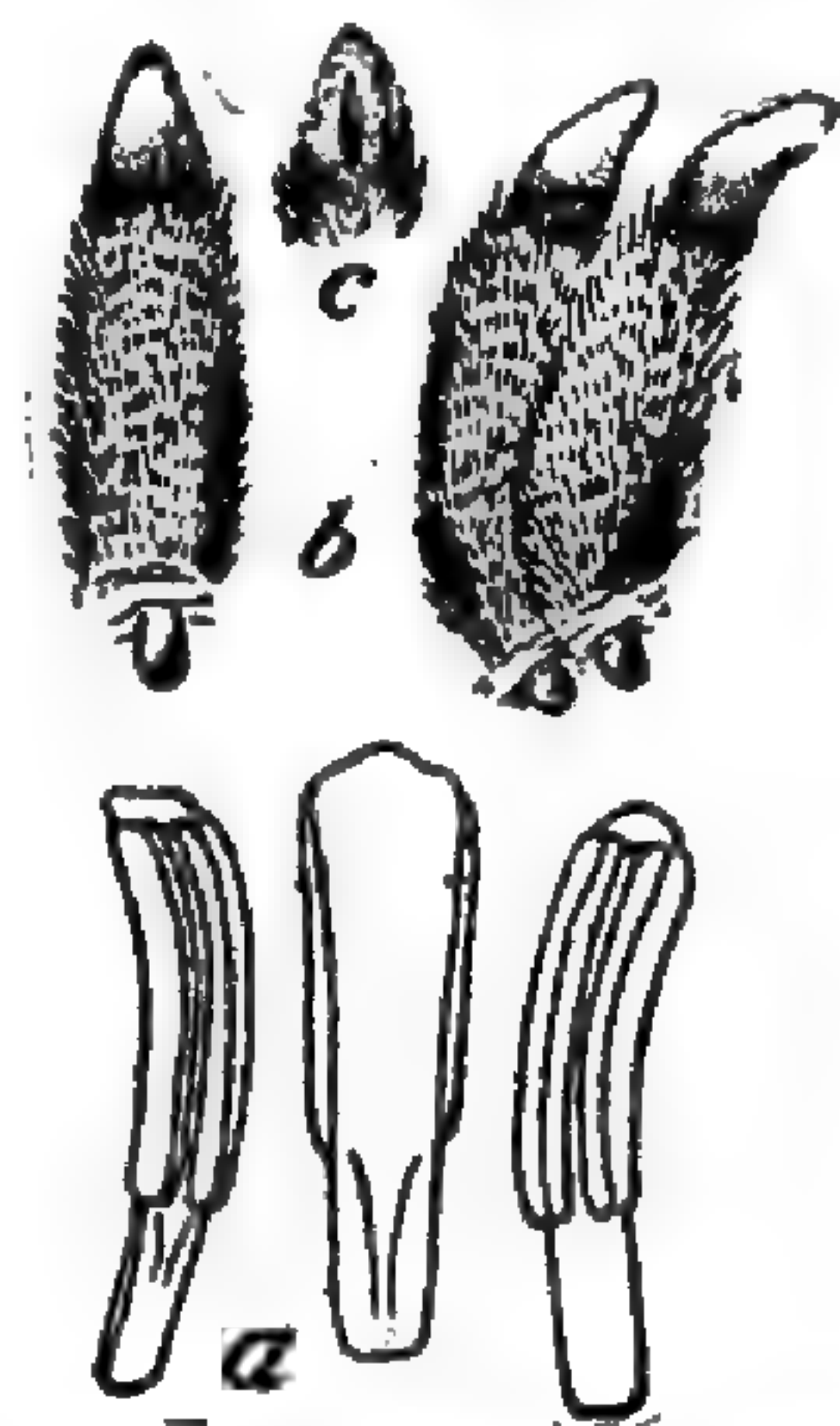


FIG. 58.—Essential parts of flower of *Annona bullata*. a, Stamens; b, carpel; c, ventral view of style, showing median groove. Scale 13.

styles more pointed than Richard's figures of the corresponding organs would indicate, while plate 27 shows that the flowers are not subterminal as originally described, but issue normally from the base of the branchlets, and that the mature petals are almost flat and rounded at the apex, instead of subtriquetrous and subacute. The indument of the peduncle and calyx is ferrugineous or deep cinnamon color, while that of the outer petals is composed of much finer hairs and is pale rufous or fulvous.

Richard is quite right in recognizing the relation of this species to *Annona cherimola*, but, for the reasons assigned in describing the section *Saxigena*, it seems advisable to place this and *A. crassivenia* in a special section.

This species, on account of the aromatic properties of the wood, is called "laurel." The leaves are eaten by horses and cattle and the fruit by pigs. The latter is described as hard and sour and unfit for the table. The pubescence of its surface is fulvous rather than ferrugineous. Its seeds are remarkable for the bright golden, smooth, waxlike surface of their thin testa. They are inclosed when fresh by a thin membranous aril and are surrounded by scant pulp.

EXPLANATION OF PLATES 27, 28.—Pl. 27, photograph of Britton & Cowell's no. 13329, U. S. Nat. Herb. Natural size. Pl. 28, photograph of Wright's no. 327, U. S. Nat. Herb., exactly similar to type specimens collected by Ramon de la Sagra in Herb. De Candolle.

Annona crassivenia Safford, sp. nov.

Annona bullata Griseb. Cat. Pl. Cub. 2. 1866, not A. Rich.

Section *Saxigena*. A small tree; branches slender, densely ferrugineous-tomentose when young, at length glabrate, grayish brown, longitudinally plicate-



FIG. 59.—Stamens of *Annona crassivenia*. Showing pollen sacs after dehiscence. Scale 13.

striate and bearing inconspicuous brownish lenticels; leaves orbicular or broadly ovate, rounded or retuse at the apex and rounded at the base, 5.5 to 7.8 cm. long and 4.5 to 7 cm. broad, when young pubescent above and clothed beneath with thick ferrugineous tomentum, at length sparsely pubescent or glabrate above, the midrib and lateral nerves impressed and persistently ferrugineous-tomentose beneath, with remarkable raised subparallel veins between the prominent lateral nerves and midrib inclosing concave reticulate areoles; lateral nerves 9 to 11 on each side; petioles 4 to 5 mm. long, grooved above, densely and persistently ferrugineous-tomentose; peduncles solitary, extra-axillary on the young branchlets, 10 to 13 mm. long, persistently ferrugineous-tomentose

and bearing a tomentose bracteole at the base; flowers resembling those of *Annona cherimola*, "dull greenish" when fresh; calyx small, about 4 mm. in diameter, gamosepalous, subtriangular, with the points obtusely acuminate or cuspidate; petals 6, the outer linear, tapering gradually toward the subacute apex, 24 mm. long and 4 mm. broad at the base, triquetrous or keeled within along the median line to the apex, hollowed at the base to receive the essential parts, clothed on the outside with a pale rufous or fulvous tomentum, lighter colored and finer than that of the calyx, grayish-tomentulose within; inner petals minute, not exceeding the stamens in length, rufous-tomentulose and keeled on the outside; torus convex; stamens numerous, about 1.3 mm. long; filaments brown, tapering to the base; pollen sacs 0.85 mm. long, contiguous, whitish, surmounted by the rounded apex of the connective, the latter not equal to the two pollen sacs in breadth; carpels numerous, closely crowded into a pyramidal gynœcium, the ovaries about equal in length to the pollen sacs and densely clothed with long straight white ascending hairs; style ovoid or oblong, tapering to an obtuse stigmatic point with a median ventral suture;

fruit broadly ovoid or subglobose, 4.3 cm. long and 4.1 cm. broad in the (immature) type specimen, its surface ferrugineous-tomentose or cinnamon-colored, the carpels terminating in low obtuse protuberances; seeds numerous (in type specimen), very closely crowded, obovate or oblong, compressed, about 11 mm. long and 6 mm. broad, with a thin tan-colored testa. (PLATES 29, 30. FIGURE 59.)

Type in the Gray Herbarium, collected at Los Almacigos, Province of Pinar del Rio, near the western extremity of the island of Cuba, July 26, 1862, by C. Wright (no. 1845); duplicates in the Göttingen Herbarium and the De Candolle Herbarium.

DISTRIBUTION: Province of Pinar del Rio, Cuba.

SPECIMENS EXAMINED:

CUBA: Type specimen as cited and duplicate of type in Herb. De Candolle; near Herradura, *Van Hermann* in Herb. Fr. Leon, Habana, Cuba (tracings of leaves and fruit).

Annona crassivenia is closely related to *A. bullata* A. Rich., but differs from it as set forth in the discussion under that species. The latter has the upper normal leaves ovate or ovate-oblong and often mucronulate as shown in figure 30, while the leaves of the present species are normally orbicular or nearly so, with thicker and denser reticulations between the secondary nerves, as shown in figure 31. The flowers of both species resemble those of the section *Atta*, but differ from them in having the terminal point of the stamen-connectives less broadly expanded, approaching more closely to the form of the connectives of the group *Annonellae*.

EXPLANATION OF PLATES 29, 30.—Pl. 29, photograph of type, showing remarkable venation of lower surface of the leaves. Pl. 30, leaves and bud of duplicate of type in De Candolle Herbarium, and fruit of type in Gray Herbarium. All natural size.

Annona cascarilloides
Wright.

Annona cascarilloides C.
Wright in Griseb. Cat.
Pl. Cub. 2. 1866.

Section *Annonula*. A
branching shrub 2 meters
high; young branchlets,

petioles, and peduncles ferrugineous, appressed-hirtellous; leaves small, subsessile, approximate, oblong-linear, mucronulate, obtuse at the apex, obtuse or acute at the base, the margins revolute, glabrous above, the midrib deeply impressed, sparsely pubescent beneath with scattered ferrugineous hairs, at length glaucous and glabrescent with the prominent midrib densely covered with persistent appressed bright ferrugineous or cinnamon-colored hairs like those on the young branchlets and petioles, 37 to 25 mm. long and 8 to 6 mm. broad; lateral nerves

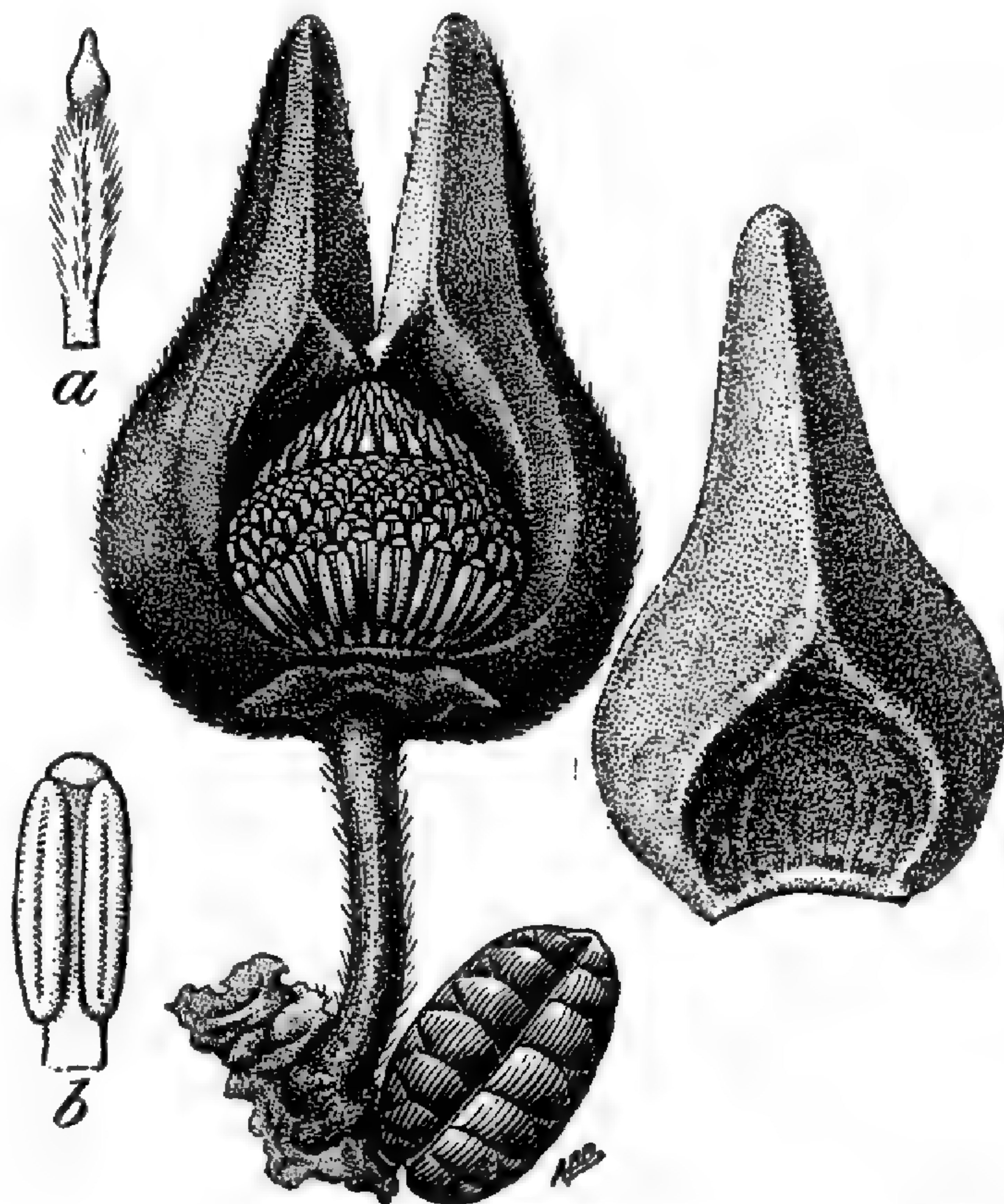


FIG. 60.—Flower of *Annona cascarilloides*. One petal removed. *a*, Carpel; *b*, stamen. Flower, scale 4; *a*, *b*, scale 13.

13 to 15 on each side, almost at right angles to the midrib, forking dichotomously before reaching the margin; peduncles solitary, subterminal on short lateral branchlets, 5 to 7 mm. long; flower buds obclavate or obpyriform; calyx lobes triangular, 2.4 mm. long and 2.4 mm. broad at the base, clothed with ferruginous appressed hairs on the outside; outer petals thick, valvate, broadly ovate and long-acuminate, hollowed at the base to cover the essential parts, the long tapering distal portion triquetrous and terminating in a rounded or acutish apex, ferruginous-puberulent on the outside, glabrous within, 12 to 20 mm. long and 6 to 7 mm. broad at the base; inner petals entirely absent in flowers of type material; torus convex, glabrous between the bases of the filaments; stamens numerous, 1.6 mm. long, the two linear pollen sacs contiguous, the apex of

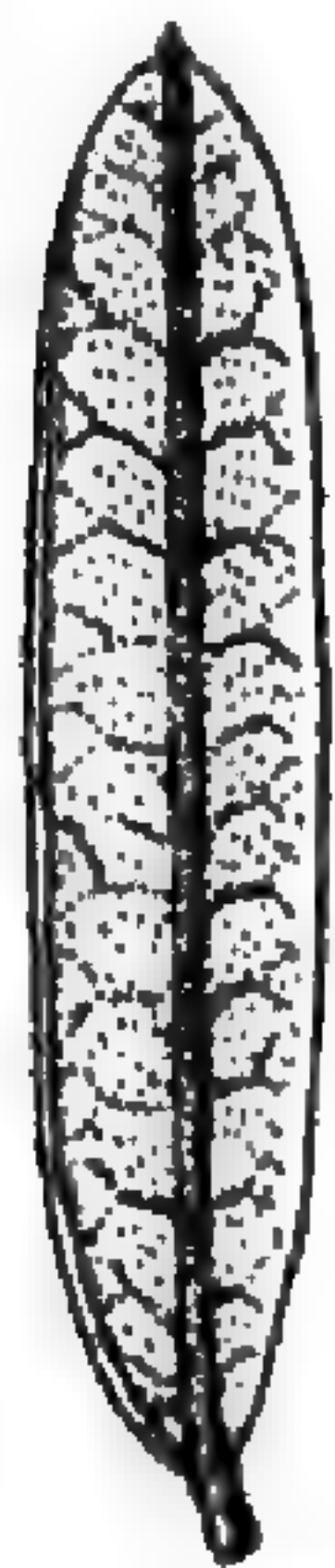


FIG. 61.—Leaf of *Annona cascarilloides*. Lower surface. Natural size.

the connective above them not broadly expanded but similar in form to that of the stamens in the section *Annonella*; carpels equal in length to the stamens, closely appressed to form a conical gynœcium; ovaries covered with appressed pale rufous hairs and bearing at their apex a fleshy tapering style; fruit spheroid, 3 to 3.5 cm. in diameter, glabrescent, thin-skinned, neither squamose nor tuberculate, but the areoles corresponding to the individual carpels gibbous (in the dry fruit); mature peduncle slender, the calyx persistent; seeds obovate-oblong, laterally somewhat compressed and marginate on one side, 12 to 16 mm. long and 8 mm. broad (in type specimen), the thin testa more or less wrinkled and glossy brown as though varnished; pulp soft. (PLATE 31. FIGURES 60, 61.)

Type in the Göttingen Herbarium, collected at Paredones de San José, in the Province of Pinar del Rio, near the western extremity of the island of Cuba, in flower, June 10, in fruit, August 14, 1862, by C. Wright (no. 1848). Duplicates in the Gray and De Candolle herbaria.

DISTRIBUTION: Western Cuba.

SPECIMENS EXAMINED:

CUBA: Province of Pinar del Rio, Paredones de San José, C. Wright 1848 (type collection, Gray and De Candolle herbaria).

LOCAL NAMES: Anoncillo de Paredon; Anoncillo de Sabana (Province of Pinar del Rio).

Annona cascarilloides owes its specific name to the resemblance of the venation of its leaves (fig. 61) to that of the leaves of certain species of the genus *Cascarilla*. The flowers were said in the original description to resemble those of the genus *Rollinia*, but this statement is quite misleading (see fig. 60). They appear to be intermediate in form between the flowers of *Annona cherimola* and those of *A. globiflora*. In their swollen base and slender apex they are not unlike the flowers of *A. acutiflora* Mart. of Brazil, but the latter have conspicuous inner petals, and these are quite lacking in the specimens of *A. cascarilloides* examined. The fruit, which is about as large as a plum, is devoid of protuberances or stigmatic scars.

EXPLANATION OF PLATE 31.—Photograph of type material in the De Candolle Herbarium, showing leaves, flowers, and fruit, the latter distorted by compression. Natural size.

Annona sclerophylla Safford, sp. nov.

Section *Annonula*. A shrub 2 or 3 meters high with short crowded branchlets and rigid approximate aromatic leaves; young branchlets and peduncles densely and shortly ferruginous-tomentose; leaves thick-petioled, at first coriaceous, at length rigid, oblong-linear with the midrib deeply impressed above

and prominent beneath and the margins revolute, usually rounded and often apiculate at the apex, commonly rounded at the base, 3 to 5.5 cm. long, 8 to 11 mm. broad, glabrous and glossy above with the surface convex on each side of the midrib and covered with areoles formed by the reticulate veins between the lateral nerves, these 16 to 18 on each side, at right angles to the midrib and decurved toward the petiole; lower surface densely and persistently fulvous-tomentulose, the feltlike indument more or less concealing the venation on each side the prominent midrib, the latter at length glabrescent and longitudinally striate, never ferrugineous-hirtellous as in *Annona cascarilloides*; petioles 3.5 mm. long, 1.5 to 2 mm. thick, grooved above and persistently rufous-tomentulose; peduncles extra-axillary, often subterminal on short lateral branches, solitary, 1-flowered, 5 to 13 mm. long, minutely ferrugineous-tomentulose and bearing one or two small ovate bracteoles near the base; flower buds (young ones only observed) rufous-tomentulose or fulvous-tomentulose, oblong-pyramidal, obtuse or rounded at the apex, little swollen at the base, 6 to 9 mm. long; calyx cup-shaped, gamosepalous, 3-lobed, the lobes broadly ovate, acute or obtuse, clothed on the outside with ferrugineous tomentum like that of the peduncle; petals 3, valvate, thick, triquetrous, clothed on the outside with rufous or fulvous tomentum, excavated at the base to receive the essential parts, the cavity lined with fine tomentum; torus convex; stamens numerous (those of immature flowers only observed) 1 mm. long, their connectives terminating in a somewhat expanded apex above the pollen sacs, but not broadly capitate or hooded as in the section *Atta*; carpels about equal in length to the stamens, closely crowded to form a cone-shaped gynoecium; ovary clothed with appressed rufous hairs; style fleshy, slender, tapering; fruit not observed. (PLATE 32, FIGURES 33, p. 21; 62.)

Type in the Herbarium of the New York Botanical Garden, collected on the "Loma Menquira" (Mayari?), a short distance south of the Bay of Nipe, Province of Oriente, near the eastern extremity of Cuba, February 2, 1910, by J. A. Shafer (no. 3796).

DISTRIBUTION: Known only from the type locality.

SPECIMENS EXAMINED:

CUBA: Type material as cited.

This species was found growing in the form of a much branching shrub, about 8 feet high, at an elevation of about 680 to 1,000 meters above sea level in thin soil. The aromatic, brittle leaves have very much the flavor of nutmeg and bear a resemblance to those of *Annona cascarilloides* of western Cuba. However, they are covered beneath with persistent fulvous feltlike tomentum and are devoid of the bright-ferrugineous hairs which occur on the midrib and lower surface in the latter species, while the lateral nerves are peculiar and differ from those of all other known species of the genus in curving backward or downward toward the petiole, as shown in figure 33.

EXPLANATION OF PLATE 32.—Photograph of the type specimen. Natural size.



FIG. 62.—Flower of *Annona sclerophylla*. Bud with one petal removed. *a*, Stamens; *b*, carpel. From type specimen. Flower, scale 4; *a*, *b*, scale 13.

Annona globiflora Schlecht.

Annona globiflora Schlecht. Linnæa 10:235. 1836.

Annona fruticosa Moc. & Sessé, Fl. Mex. ed. 2. 134. 1894.

Section Annonella. A shrub 1 to 2 meters high with a spreading bushy habit of growth; leaves thin-membranaceous, punctate, deep green above, paler beneath; new branchlets rufous-pilose, at length glabrate, and finally plicate-striate, brown, dotted with very small inconspicuous pale brown lenticels; leaves oblong-lanceolate to oblong-elliptical, 4 to 9 cm. long and 15 to 20 mm. broad, with 7 to 9 lateral nerves on each side, usually obtuse or rounded but sometimes acute at the apex, acute at the base, the leaves near the base of the branchlets smaller and relatively broader than the others, sometimes ovate or even orbicular, as in many other Annonaceae, the margins slightly revolute,

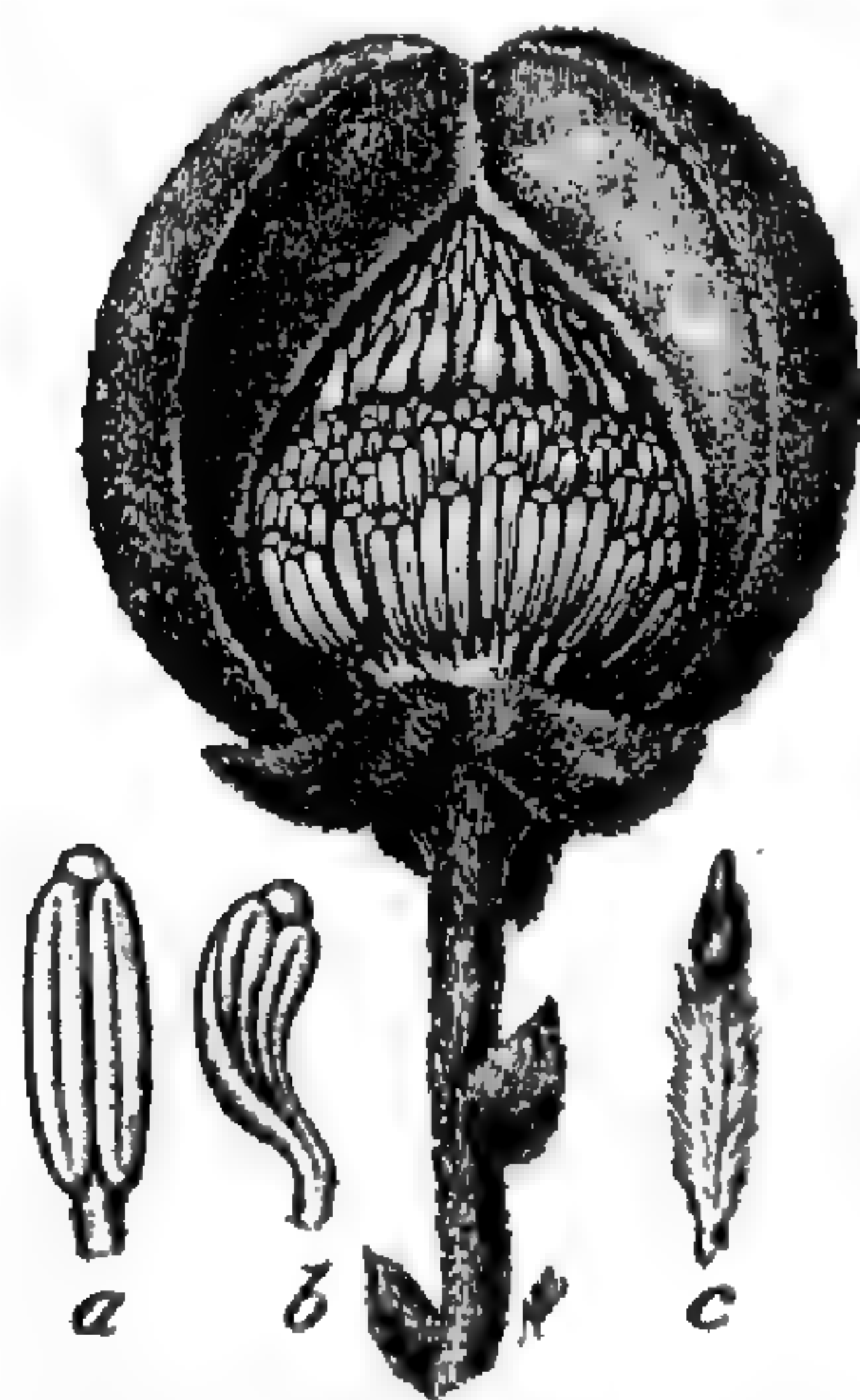


FIG. 63.—Flower of *Annona globiflora*. Bud with one petal removed. a, b, Stamens; c, carpel. Flower, scale 4; a, b, c, scale 13.

glabrate above and sparsely puberulent beneath; petioles about 3 mm. long, clothed like the midrib beneath and the peduncles with appressed ferrugineous hairs scarcely apparent to the naked eye; peduncles in pairs or solitary, extra-axillary, often opposite a leaf, 1-flowered, 4 to 5 mm. long, with two small hirtellous bracteoles, one at the base and one near the middle; flower buds globose, 7 to 8 mm. in diameter; calyx lobes triangular, hirtellous with appressed ferrugineous hairs on the outside; torus convex or subconoid; stamens numerous, 1.5 mm. long, the connective thickened at the apex, but not dilated into a hoodlike covering above the pollen sacs; carpels almost equal to the stamens in length, the ovaries appressed-pilose, surmounted by taper-pointed velvety styles with a median ventral stigmatic groove, becoming suffused with a viscous fluid at the time of pollination and soon afterwards dropping off in a coherent mass; fruit small, spheroid or broadly conoid, 3 or 4 cm. in diameter, its surface

muricate, or mamillate with stout salient nipple-like points, the integument glabrous and minutely granular, no distinct lines marking the areoles formed by the individual carpels; seeds unsymmetrically obovate, somewhat compressed and marginate, about 12 mm. long and 6 mm. broad, with a swollen caruncle at base and with a golden brown thin glossy testa more or less wrinkled by the inclosed ruminant albumen; pulp scanty, edible. (PLATE 33. FIGURE 63.)

Type collected near the Hacienda de la Laguna, a short distance south of Jalapa, State of Veracruz, Mexico, August 29, 1828, by J. Schiede (no. 298).

DISTRIBUTION: Mexico, eastern subtropical region of the States of San Luis Potosí, Tamaulipas, and Veracruz.

SPECIMENS EXAMINED:

MEXICO:

VERACRUZ: Type specimen, as cited; Zacuapan, *Purpus*, 2443.

SAN LUIS POTOSI: Las Canoas, *Pringle* 3796; *Palmer* 224.

TAMAULIPAS: Victoria, *Nelson* 6666 (in fruit); *Palmer* 55 (in flower), 439.

LOCAL NAMES: Anonita de papagayos (Espinal); Anonilla (Veracruz); Chirimoya cimarrona (Huasteca region of San Luis Potosí and Tamaulipas).

In its low bushy habit this species is quite distinct from all other Mexican Annonas. Its closest allies are the recently discovered *Annona bicolor* Urban

and *A. rosei* Safford of the island of Hispaniola, from both of which it differs decidedly in the character of its leaves. These resemble those of the South American *Rollinia emarginata* in their texture and venation. The small globose flowers are no larger than chick-peas (*garbanzos*). In the type specimens, as described by Schlechtendal, more or less imperfect minute inner petals were present, but in the specimens examined by the present writer no inner petals were observed. It is quite probable, however, that they are sometimes present, as in *Annona rosei*.

Annona globiflora was first collected the latter part of the 18th century near the village of Espinal, in the State of Veracruz, by Mociño, and it was described under the name *Annona fruticosa* in Mociño & Sesse's *Flora Mexicana*. This work, however, remained in manuscript for nearly a century, and the description was not published until 1894, as above cited. The name *Annona globiflora*, very appropriately applied to it by Schlechtendal in 1836, must therefore take precedence. Mociño states that the muricate fruit is about as large as a plum, and translates the common name "anonita de papagayos" as "little custard apple of the parrots."

EXPLANATION OF PLATE 33.—Photograph of leaves, flowers, and fruit collected near Victoria, in the State of Tamaulipas, Mexico, the flowers by Dr. Edward Palmer, the fruit by E. W. Nelson.

Annona bicolor Urban.

Annona bicolor Urban, Symb. Antill. 7: 223. 1912.

Annona axilliflora Spreng. Syst. Veg. 2: 642. 1825, not *A.?* *axilliflora* DC. Prodr. 1: 86. 1824.

Section Annonella. A shrub or small tree; young branches slender, minutely subappressed-pilose or hirtellous, at length glabrate, terete, densely plicate-striate when dry, grayish brown, conspicuously dotted with pale grayish lenticels;

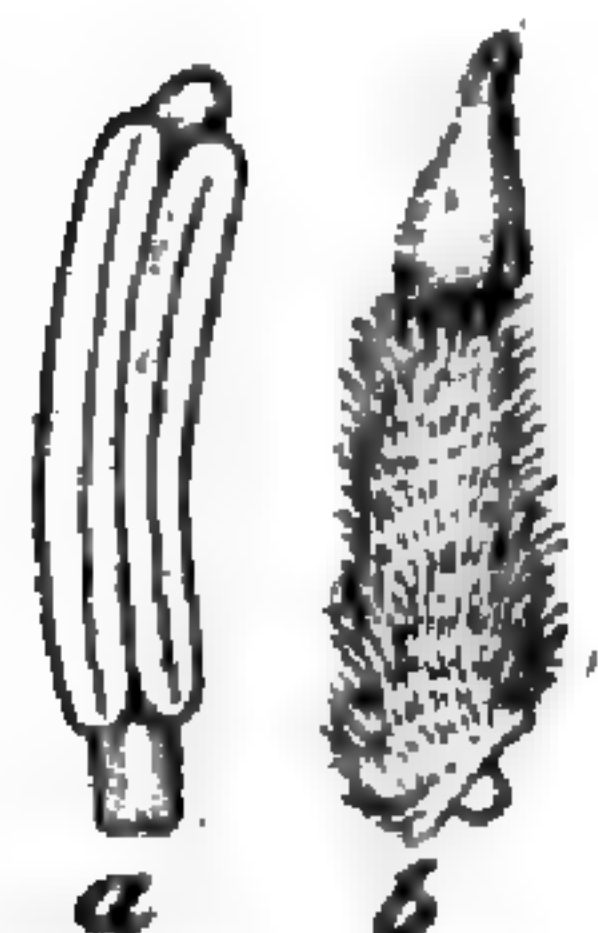


FIG. 65.—(a) Stamen and (b) carpel of *Annona bicolor*. Scale 13.

leaves with petioles 3 to 7 mm. long, variable in shape, those at the base of the branchlets, as in many other Annonaceae, smaller and relatively broader than the succeeding ones, orbicular or suborbicular, rounded or emarginate at the apex, 1.5 to 3 cm. long by 1.5 to 2.5 cm. broad, the succeeding ones ovate to ovate-elliptical, rounded or obtuse at the base and often abruptly decurrent on the petiole, 3 to 7 cm. long by 2 to 5 cm. broad, in veneration glabrous above and ferrugineous-tomentulose beneath, at length glabrescent beneath with the nerves minutely fulvous-pilose or hirtellous, on both faces reticulate between the nerves, beneath pale greenish gray and densely clothed with very minute tomentulum (as seen beneath the microscope); flowers very small, in pairs or solitary, on short hirtellous peduncles not

exceeding the petioles in length, issuing from the base of the young branchlets and subtended by two minute triangular pilose bracteoles; flower buds subglobose-triangular, often obtusely acuminate, 5 to 6 mm. in diameter; calyx lobes broadly triangular, soon reflexed, 1.5 mm. long, ferrugineous-hirtellous; petals 3, fleshy, semiorbicular-triangular, sometimes obtusely acuminate at the apex, 5 mm. long and about 5 mm. broad, clothed on the outside with short appressed rufous hairs; stamens numerous, in 3 or 4 series, 1.2 to 1.4 mm. long, the linear pollen sacs borne on the back of a thick, fleshy connective, this obtuse or rounded at the apex, but not expanding into a hoodlike cap above the pollen sacs; carpels numerous, forming a broadly pyramidal gynœcium; ovaries



FIG. 64.—Flower of *Annona bicolor*. Bud with one petal removed. From duplicate type in U. S. National Herbarium. Scale 2.

minutely rufous-pilose, with a single ovule at the base and a fleshy taper-pointed style at the apex; fruit (hitherto undescribed) subglobose or very broadly ovate and depressed at the base, with an axial length of 3.5 to 4 cm. and a diameter of 4 to 4.5 cm., glabrous, with the component carpels somewhat gibbous but not outlined by distinct areoles; seeds remarkable for their smooth polished black or dark brown testa, unsymmetrically obovate-oblong, often apiculate, distinctly marginate, and with a swollen caruncle at the base, somewhat compressed, 12 to 16 mm. long and 8 to 9 mm. broad. (PLATE 34. FIGURES 64, 65.)

Type in the herbarium of the Royal Botanical Museum, Berlin (without fruit) collected near Barahona, south coast of Santo Domingo, near the Haitian frontier, in April, 1911, by Rev. Miguel Fuertes (no. 258).

DISTRIBUTION: Santo Domingo.

SPECIMENS EXAMINED:

SANTO DOMINGO: Duplicate of type; same locality and collector, fruits, September, 1912 (both U. S. Nat. Herb.).

LOCAL NAME: Guanabanita (Barahona, Santo Domingo).

The closest ally of *Annona bicolor* is *Annona globiflora* Schlecht. of eastern Mexico. From this species it differs in its thicker, broader, coriaceous leaves, its smoother black-seeded fruits, and its pointed flower buds. A specimen of the type collection in the United States National Herbarium bearing the label "*Annona axilliflora* Spr.?" was recognized as a new species by the writer, who communicated the fact to Professor Urban, asking that Father Fuertes be requested to secure fruit from the type specimen, in order that the description of the species might be completed. Professor Urban replied that he had already "published the new *Annona* of Santo Domingo as *A. bicolor* in Symb. Antill. VII. (June, 1912), p. 223.—Fuertes no. 258," and added that he had not seen fruits. Fruits of the type plant were afterwards received by the writer directly from Padre Fuertes, who described them as of a green color on the exterior when fresh and cream color in the interior. "The fruit," he added, "smells like some of the other Anonaceae and keeps the characteristic odor of the family. The leaves and wood are fragrant, and I do not doubt but that they would yield a good [aromatic] extract."

The species was previously collected in 1819 to 1820 by Carlos Bertero on the island of Hispaniola, and was referred by Sprengel to *Annona axilliflora* DC., but the latter is a Guiana plant with much longer peduncles, as Professor Urban has already pointed out. From figure 64, showing a flower bud with one petal removed, and figure 65, showing a stamen and carpel, it will be seen at a glance that the present species is closely allied to the Mexican *A. globiflora* Schlecht., the type of the section *Annonella*. The recent discovery by Dr. J. N. Rose of another species of this section on the island of Santo Domingo, not very far from the type locality of *A. bicolor* is interesting.

EXPLANATION OF PLATE 34.—Photograph of duplicate of type in U. S. National Herbarium, together with fruit and seeds. Natural size.

Annona rosei Safford, sp. nov.

Section *Annonella*. A shrub or small tree, 2 to 6 meters high, with straight erect stems, slender ascending branches, and willow-like foliage; young branches subappressed ferrugineous pilose, at length becoming reddish brown or grayish, plicate-striate, bearing many conspicuous whitish lenticels; leaves oblong-lanceolate, the margins revolute, obtuse or rounded at the base and gradually tapering to a very acute apex; those at the base of branchlets frequently rounded or retuse at the apex and shorter than the succeeding ones; nor-

mal leaves 5 to 9 cm. long by 1.6 to 2 cm. broad with 12 to 18 lateral nerves on each side forming an acute angle with the midrib and curving gently upward, membranaceous, the parenchyma reticulate, punctulate, deep green and glabrous above with the midrib impressed, dull green and sparsely pubescent beneath, with the prominent midrib and lateral nerves ferrugineous-hirtellous; petioles grooved above, 3 to 4 mm. long, clothed like the new branchlets with sub-appressed ferrugineous hairs; peduncles solitary, extra-axillary, short and slender, nodding or recurved, about 4 mm. long, minutely appressed ferrugineous hirtellous, with a small ovate bracteole below the middle and a second at the base, these like the calyx appressed ferrugineous hirtellous; flower buds broadly ovate-conoid, rounded at the apex, 9 to 10 mm. in diameter, and 9 mm. high; calyx small, ferrugineous-hirtellous, with 3 broadly ovate lobes, at first appressed, at length recurved at the apex; outer petals very thick, valvate, triquetrous, hollowed at the base to receive the essential parts, finely ferrugineous-pubescent on the outside, 9 mm. long and 7.5 mm. broad; inner petals normally scalelike, not exceeding the stamens in length; not infrequently one of them abnormally enlarged, thrusting itself between two of the outer petals and ferrugineous-pubescent on the outside like them; torus convex, clothed with whitish hairs between the bases of the filaments; stamens numerous, 2 mm. long, in 3 or 4 series, with the fleshy incurved connective terminating in an obtuse apex less than the two pollen sacs in width, not expanded into a hoodlike covering above the pollen sacs; carpels distinct, about equal to the stamens in length, crowded into a conical gynoecium, the ovary with appressed whitish or pale rufous hairs on each side and at the base, the median portion more or less glabrous and minutely granular as seen under the microscope in fresh specimens); styles tapering to a fleshy point, with a median groove on the ventral side; fruit not observed. (PLATES 35-37. FIGURE 66.)

Type in the United States National Herbarium, no. 703452, collected at Azua, southern coast of Santo Domingo, March 20, 1913, by Dr. J. N. Rose (no. 4038). Growing in dry, rocky situations, associated with Cactaceae and other xerophilous plants.

DISTRIBUTION: Known only from the type locality.

According to Doctor Rose's field notes, *Annona rosei* is a bush or small tree from 6 to 20 feet in height. It was found mostly on the banks of a stream and adjacent low hills, in association with Agaves, Opuntias, and Acacias, the exact type locality being about 3 miles above the town of Azua along the little stream which is the source of its water supply. Azua is located in a great cactus desert on the leeward or southern side of the island and is probably one of the driest parts of Santo Domingo, the annual rainfall of the region being about 8 inches. Doctor Rose spent about ten days at Azua, collecting in all directions and looking out especially for Annonaceae, but the present species was seen only on this one occasion; not many individuals were observed, and these were included within the radius of a mile. Fortunately it was in bloom, and Doctor Rose collected fully developed flowers which were preserved in formalin. Though normally having three fleshy thick outer petals and three small scale-like inner ones, both the dry herbarium material and the flowers in formalin

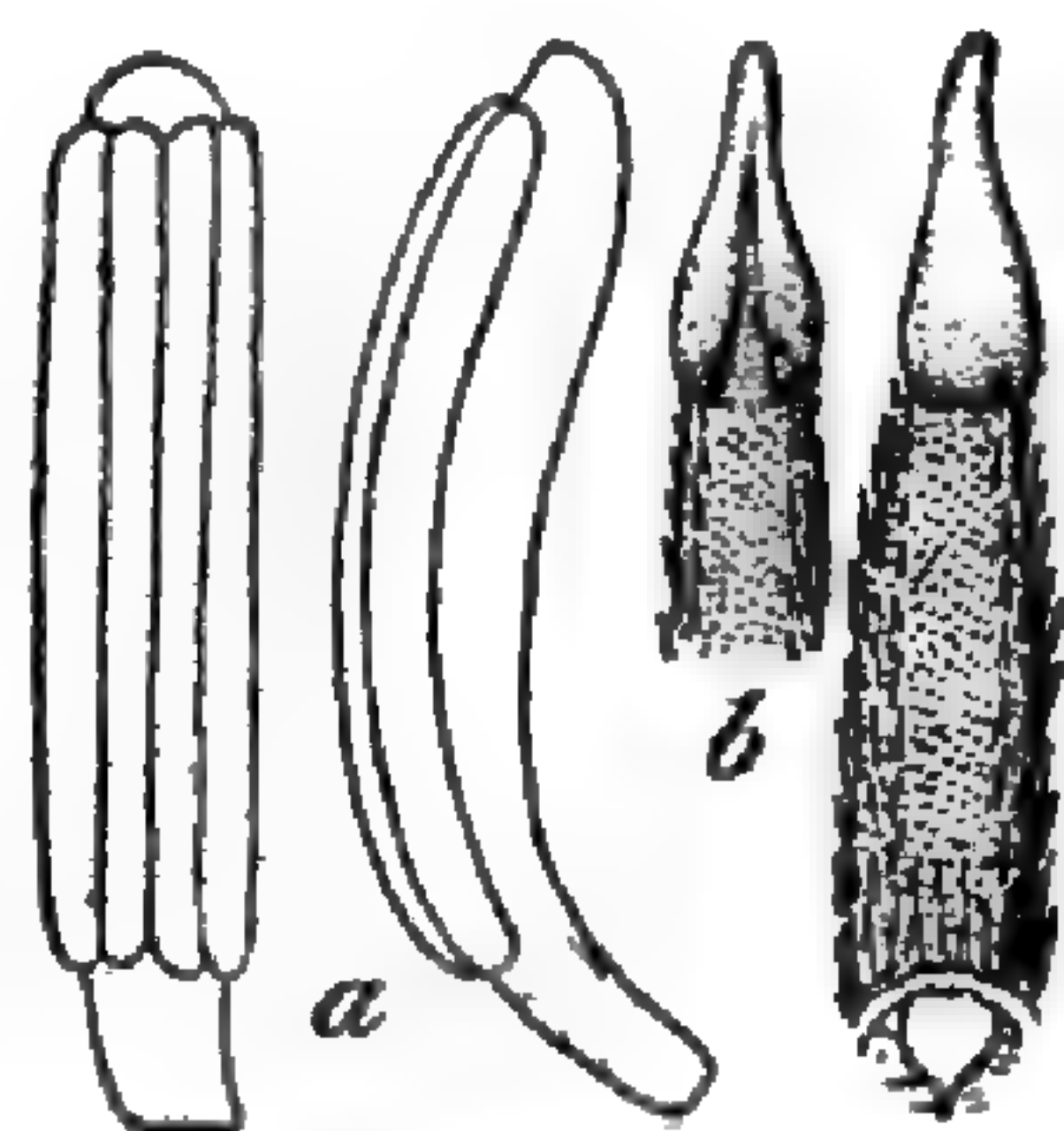


FIG. 66.—Essential parts of flower of *Annona rosei*. a, Stamens; b, carpels. Scale 13.

include specimens in which one of the inner petals is abnormally enlarged and is wedged between two of the outer petals, as shown in plate 36.

EXPLANATION OF PLATES 35-37.—Pl. 35, photograph of type plant taken in the field by P. G. Russell, of the U. S. National Herbarium. Pl. 36, flowers. *a*, Unopened bud; *b*, nearly mature normal bud with one petal removed, showing details; *c*, bud, showing abnormally enlarged inner petal forcing itself between two outer petals; *a*, *b*, *c*, scale 5. Pl. 37, branches, leaves, and solitary flowers. Natural size.

PLANTS ORIGINALLY DESCRIBED UNDER ANNONA BUT GENER- ICALLY DISTINCT.

ROLLINIA, DUGUETIA, AND RAIMONDIA, GENERA ALREADY ESTABLISHED.

Among the plants originally described under the generic name *Annona* several were found to differ so radically from the type of that genus that it became necessary to place them in distinct genera. Among the related genera are *Rollinia* and *Duguetia*, established in 1825 by Augustin de St. Hilaire, and *Raimondia*, recently established by the present author.

ROLLINIA St. Hil.

Rollinia was named in honor of the French historian Charles Rollin. Its type is *Rollinia longifolia* St. Hil.,¹ discovered by St. Hilaire on the Lagoa de Fretas, near Rio de Janeiro (pl. 38). The plants included in this genus do not differ from those of *Annona* in their essential parts nor in their fruits, but they have a peculiar gamopetalous corolla, the parts of which corresponding to the outer petals of the *Annonas* are developed into three obtuse wings or spurs, which leave only a very small opening above the essential parts. This genus includes the following species, originally referred to *Annona*.

Rollinia mucosa (Jacq.) Baill.

Anona mucosa Jacq. Obs. Bot. 16. 1764, excl. syn. Rumph.

Anona obtusiflora De Tussac, Fl. Antill. 1: 191. pl. 28. 1808.

Rollinia sieberi A. DC. Mém. Soc. Phys. Hist. Nat. Genève 5: 199. 1832.

Rollinia mucosa Baill. Adansonia 8: 268. 1868.

A small tree with the habit of *Annona reticulata* L.; young branches puberulous, at length glabrate, dark brown, longitudinally plicate with inconspicuous lighter brown lenticels; leaves ovate-oblong, acute or acuminate at the apex or sometimes obtuse, rounded or acute at the base, usually 12.5 to 15 cm. long and 5 to 6.5 cm. broad, at first sparsely pubescent above and fulvous sericeous pilose beneath, at length glabrate above except along the impressed midrib and lateral nerves (about 14 on each side), these pilose above and more densely so beneath with appressed rufous hairs; petioles 5 to 10 mm. long, grooved above, clothed with rufous hairs when young, at length glabrate or nearly so; smaller and relatively broader obtuse ovate leaves near the base of the flowering branches; peduncles solitary, extra-axillary, usually opposite a leaf, 1-flowered, 2 to 3 cm. long, clothed with minute appressed rufous hairs

¹ Fl. Bras. Merid. 1: 29. pl. 5. 1825.

and bearing 2 ovate bracteoles, one at the base, the other near the middle; calyx 3-lobed, the divisions subtriangular or broadly ovate, acute or acuminate, clothed with minute fulvous hairs; corolla gamopetalous, composed of 3 large lobes corresponding to the outer petals of an *Annona* flower and 3 minute lobes alternating with them, corresponding to the inner petals and opposite the calyx lobes; outer lobes widely diverging but not curved backward, about 15 mm. long, hollow and sacklike and closed nearly to the base, leaving only a narrow opening above the essential parts, the edges slightly overlapping the margins of the minute inner lobes; outer surface of the corolla densely fulvous-tomentulose; torus convex, covered with long fulvous hairs; stamens numerous, crowded, 1.1 mm. long, resembling those of an *Annona*, with the connective expanded at the apex into a flat process covering the two parallel pollen sacs, the latter dehiscing extrorsely by a median fissure; carpels numerous, about 1 mm. long, distinct but closely crowded into a convex gynœcium, the 1-ovuled ovaries covered with straight ascending hairs and terminating in an abruptly expanded flat style; fruit (syncarpium) resembling that of an *Annona*, subglobose, large, areolate, the areoles gibbous or wartlike, but not muricate nor papillose, more or less hexagonal in shape with the dividing lines raised; pulp fleshy, white or whitish, mucilaginous, sweet, edible; seeds obovoid, 18 to 20 mm. long by 12 to 14 mm. broad, somewhat compressed and with a caruncle at the base; testa thin, brown; endosperm wrinkled like that of other *Annonaceae*. (PLATE 39. FIGURE 67.)

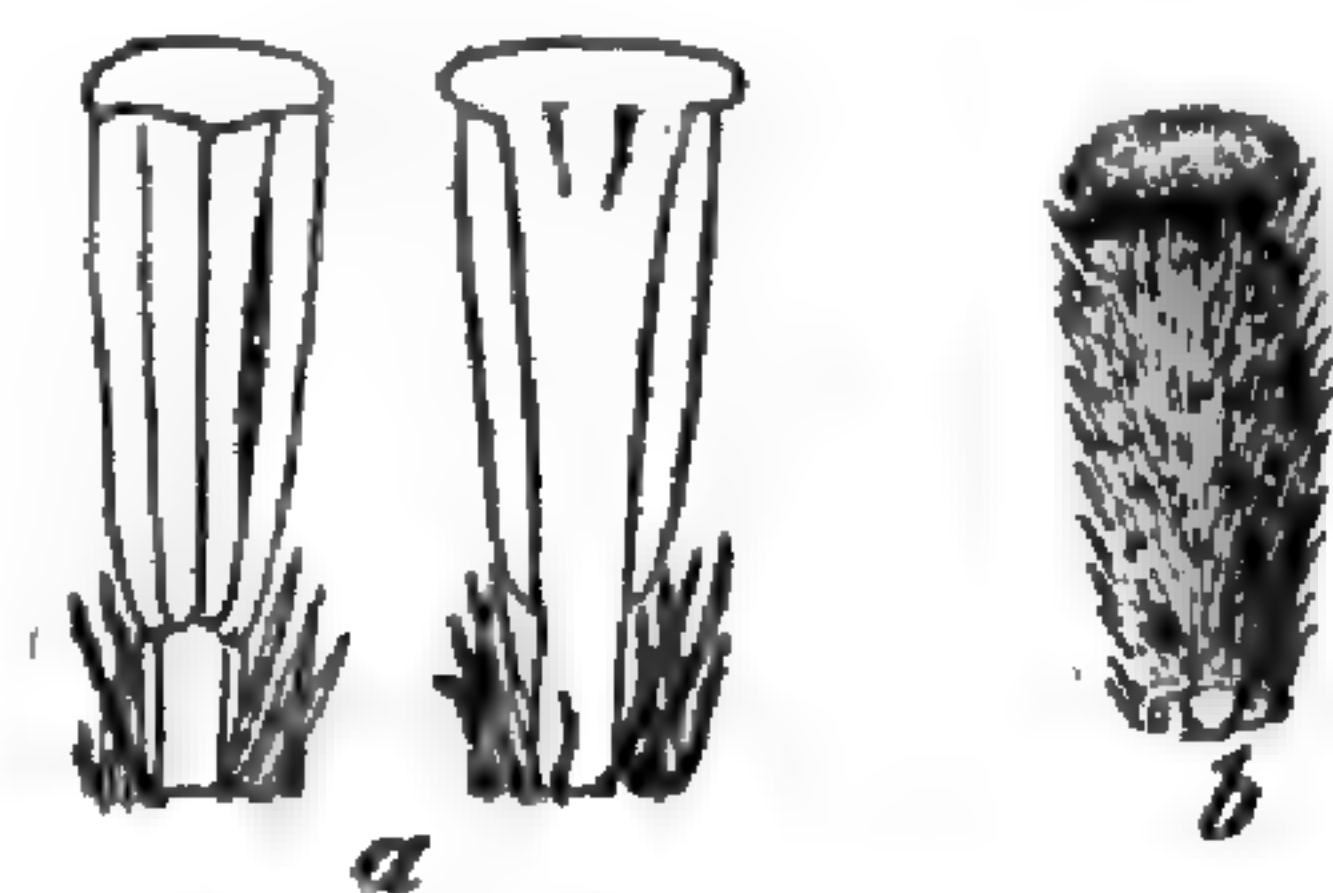


FIG. 67.—(a) Stamens and (b) carpel of *Rollinia mucosa*. Scale 13.

TYPE LOCALITY: Martinique.

DISTRIBUTION: Growing spontaneously and rarely cultivated in the West Indies, Tropical Mexico, and very probably northern South America.

SPECIMENS EXAMINED:

MARTINIQUE: Hauteurs du Prêcheur et du Fond Canonville, 1881, *Père Duss* 1045 (U. S. Nat. Herb.).

GUADELOUPE: Camp Jacob, "petit arbre, rare, cultivaté cà et là pour ses fruits, fl. en février, mars, et avril," *Père Duss* 3059 (U. S. Nat. Herb., with flower and fruit).

ISLAND OF TRINIDAD: Without definite locality, Herb. Bot. Gardens Trinidad, no. 2774 (two sheets in Herb. John Donnell Smith).

PORTO RICO: Prope Adjuntas, in sylva montis Galsa, *Sintenis* 4170.

LOCAL NAMES: Cachiman morveux, Cachiman montague (French Antilles); Anona babosa, Zambo (tropical Mexico).

Rollinia mucosa is a species with large edible fruit, but this not equal in flavor to that of the chirimoya or sugar apple. It was first described by Jacquin from specimens of plants growing wild and sometimes cultivated on the Island of Martinique; and afterwards, under the name of *Anona obtusiflora*, by Tussac from a specimen growing in an orchard at the western extremity of the Island of Hayti. It is possible that more than one species is included by authors under this specific name and that wild plants with smaller flowers and inedible fruit have been erroneously referred to the species. The accompanying figure shows that the lobes of the corolla are widely diverging but with an upward curve. Other closely related species in Central America, with geminate instead of solitary flowers, decurved corolla lobes, and small fruit with seeds very much smaller than those of *A. mucosa* have been referred to the latter

EXPLANATION OF PLATES 38, 39.—Pl. 38, type specimen. Reproduced from St. Hilaire. Pl. 39, flower, fruit, and seed. Drawing by Theodore Bolton from *Père Duss* 3059, as cited. Natural size.

species or to its synonym *R. sieberi* A. DC. It is fortunate that the type localities of the plants described under the names *Anona mucosa*, *A. obtusiflora*, and *Rollinia sieberi*, all of them West Indian, are definitely known, so that specimens from the same localities can be carefully compared. It must be borne in mind that the fruits of *Rollinia* are even more important than the flowers and leaves in the identification of species, as in the case of *Anona reticulata* and *A. squamosa*, species which can be distinguished from each other only with difficulty without specimens of the fruit.

Very closely related to *Rollinia mucosa* are *R. orthopetala* A. DC., from British Guiana, and *R. pulchrinervia* A. DC., from French Guiana. Delicious fruits grown at Miami, Florida, from seed received from Pará, Brazil, have been transmitted to Mr. David Fairchild, of the Bureau of Plant Industry, at Washington, under the name *R. orthopetala*. But the flowers of *R. orthopetala* (which have never been figured) are described as having their corolla lobes erect and incurved, while those of the Miami plants have their lobes widely diverging and decurved toward the peduncle, agreeing in this respect with the

description of the flowers of *R. pulchrinervia*, which is said in the original description to be very closely allied to *R. orthopetala*, as both of them are also said to be to *R. sieberi* of Trinidad.

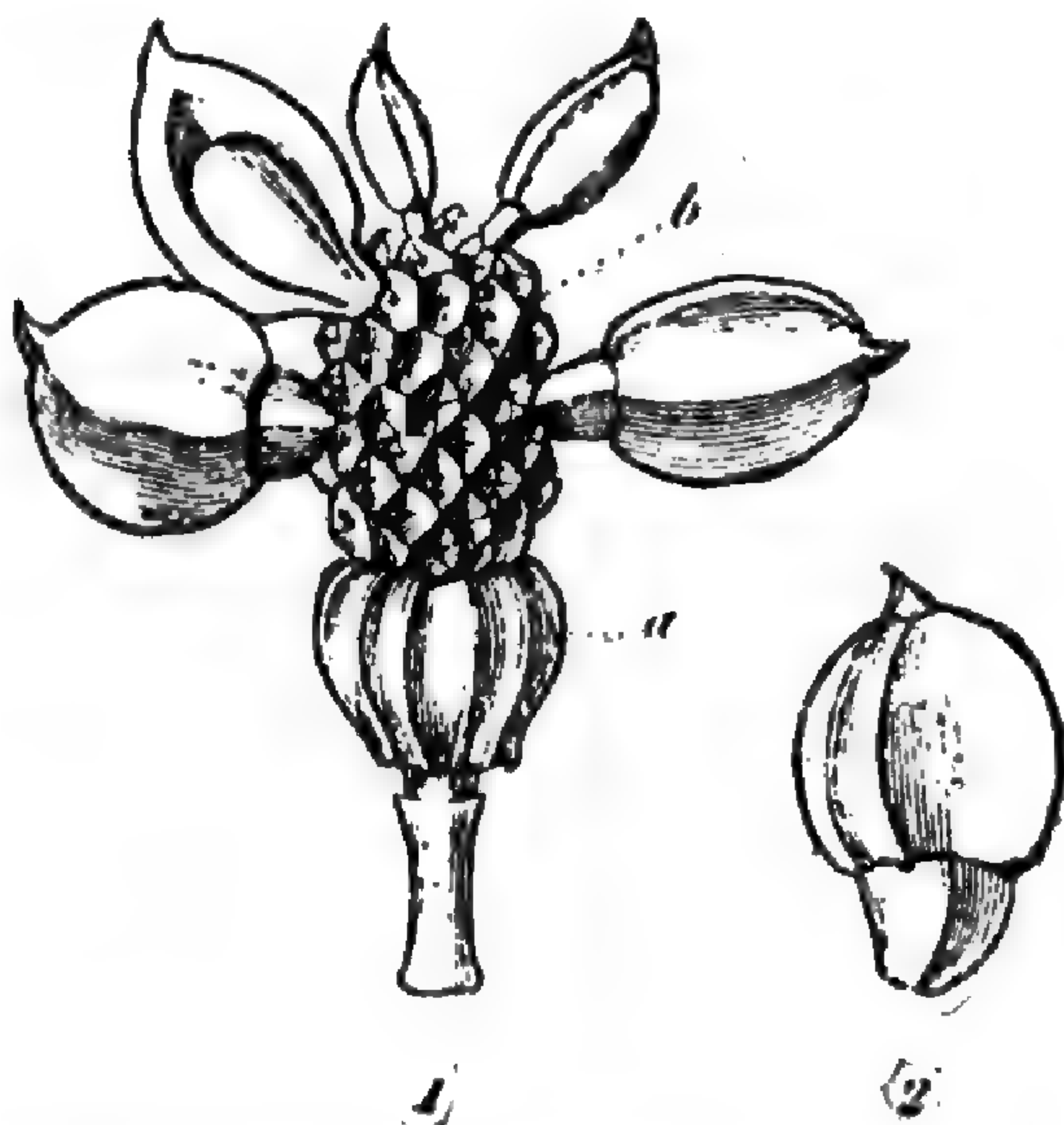


FIG. 68.—Fruit of *Duguetia lanceolata*. 1, Mature fruit with most of carpels detached; a, base of torus from which stamens have fallen; b, upper segment of torus, showing alveolate surface; 2, detached carpel. Reproduced from St. Hilaire.

syncarpium by the fusion of the carpels. In the type specimen of the genus the flowers were lacking, but these were afterwards found to differ from the flowers of *Annona* in having the petals imbricate instead of valvate in aestivation. Further, the indument of the lower surface of the leaves, petioles, and peduncles in this genus is scurfy and stellate-pilose, while in *Annona* the hairs are simple or sometimes fascicled in clusters of 2 to 6. It proved afterwards that *Anona furfuracea* St. Hil. (figs. 69, 70), described and figured in the same work in which it was published, had to be included in the genus *Duguetia*. Many species have since been added to this genus, all of which appear to have the new parts clothed with stellate pubescence or tomentum.

Duguetia was regarded by Baillon as a synonym of Aublet's *Aberemoa*, and Robert E. Fries transferred all the species of *Duguetia* known to him to this

DUGUETIA St. Hil.

Duguetia was dedicated to the venerable Abbé Jacob Joseph Duguet, who, in his stupendous "Ouvrage des Six Jours (1731), wrote elegantly concerning the wonders of the vegetable kingdom." The type of this genus is *Duguetia lanceolata* St. Hil.,¹ a plant growing in meadows at a place called Sumidouro, not far from the Villa do Principe. The fruit in this genus (fig. 68) differs from that of the genus *Annona* in being composed of distinctly woody carpels set in sockets or cavities on the hardened torus or gynophore, instead of forming a solid

¹ Fl. Bras. Merid. 1: 35. pl. 7. 1825.

genus;¹ but Aublet's figure of *Aberemoa guianensis* (fig. 71), on which the genus was based, represents the carpels as pediceled and ovate, very much like those of certain species of *Guatteria*, while the leaf, as figured by Aublet, does not appear to be that of a true *Duguetia*. The type locality of *Aberemoa guianensis* ("Habitat in sylvis remotis sinemariensibus") is not indicated with precision. Flowers were lacking in the type material and there is no specimen identified with certainty as *Aberemoa guianensis* in any herbarium, nor has its flower ever been described. An imperfect specimen in the herbarium of the Museum of Paris of a plant collected by Perrotet and Poiteau was regarded as a variety *glabrescens* of Aublet's species by Sagot, who calls attention to the fact that Aublet's type, with tomentose branchlets and slightly tomentose leaves, is absent from the herbaria of Paris, and characterizes it as "rara et pulcherrima planta nondum bene nota, insignis foliis maximis, fructu carnoso, carpidiis incomplete coalitis; videtur Anonae affinis."² It is thus doubtful if Aublet's *Aberemoa* and St. Hilaire's *Duguetia* are congeneric, and



FIG. 69.—Flower of *Duguetia furfuracea*.
Reproduced from St. Hilaire.

the latter generic name should, therefore, be retained.

RAIMONDIA Safford.³

Raimondia was named in honor of the eminent geographer and naturalist Antonio Raimondi. Its type species is *Raimondia monica* Safford⁴ from the Cordillera Central of Colombia. The fruit in this genus is a solid fleshy syncarpium very much as in *Annona*, but the flowers are monœcious and the stamens differ radically from those of both *Annona* and *Rollinia* in being devoid of the characteristic terminal swollen heads above the pollen sacs at the tips of the connectives.

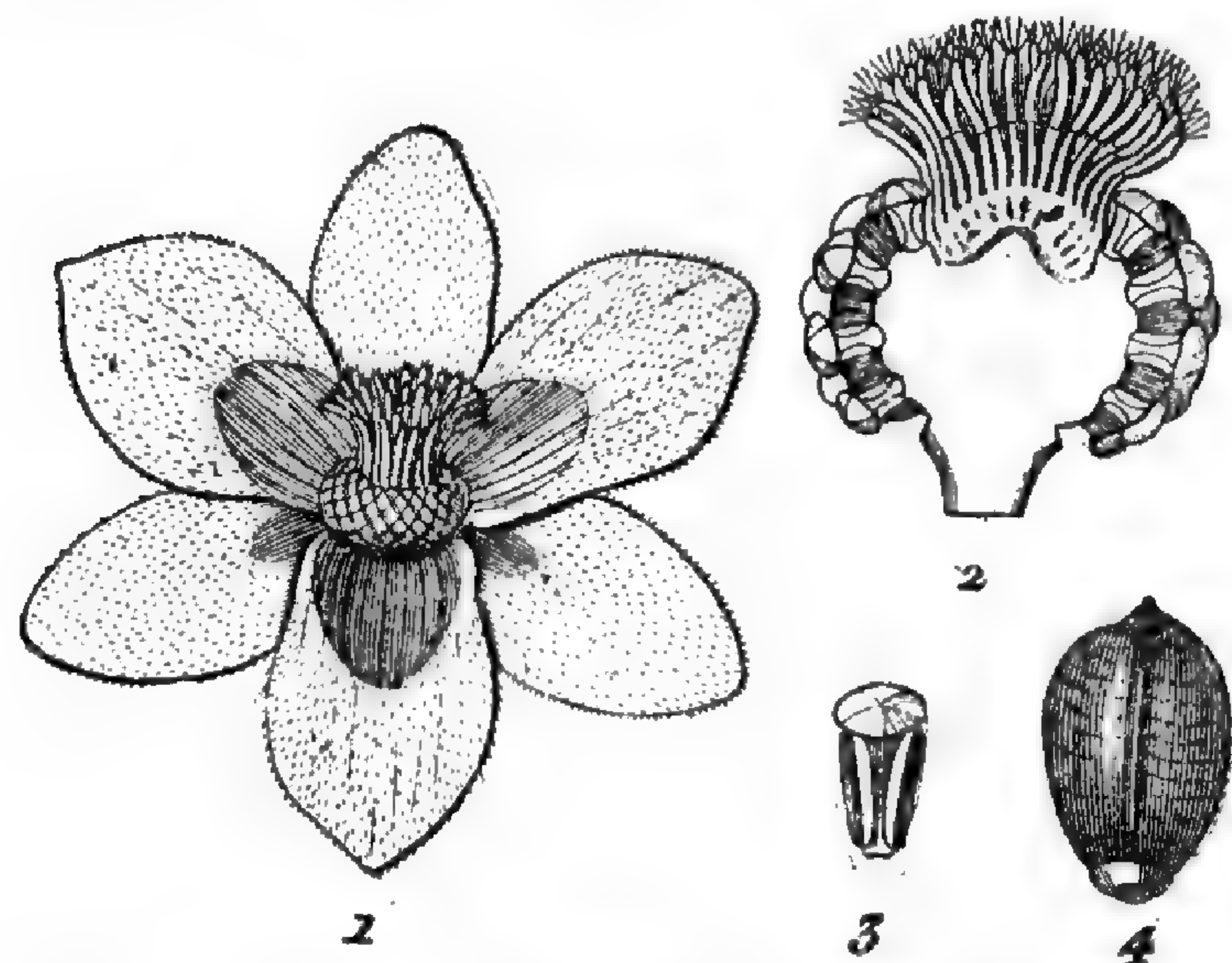


FIG. 70.—Flower of *Duguetia furfuracea*, with essential parts. 1, Open flower; 2, vertical section through the andrœcium or gynœcium; 3, stamen, dorsal view; 4, ripe seed. Reproduced from St. Hilaire.

To this genus must now be transferred the following species:

¹ Vet. Akad. Handl. Stockholm 34⁵:19. 1900.

² Ann. Sci. Nat. Bot. VI. 2:136. 1880.

³ Contr. U. S. Nat. Herb. 16:217. pl. 52, 53. 1913.

⁴ Loc. cit., 218.

Raimondia quinduensis (H. B. K.) Safford.

Anona quinduensis H. B. K. Nov. Gen. & Sp. 5: 60. 1821.

Annona conica Ruiz & Pav.; Don, Hist. Dichl. Pl. 1: 88. 1831.¹

A tree with alternate pendulous branches; branchlets terete, rugulose, glabrous, the younger ones pubescent with simple hairs; leaves alternate, lanceolate-oblong, acuminate at both ends, entire, reticulate-veined, the midrib and lateral nerves (8 to 11 on each side) prominent beneath, thin and membranaceous, at length subcoriaceous, above glabrous and smooth, beneath clothed with scattered

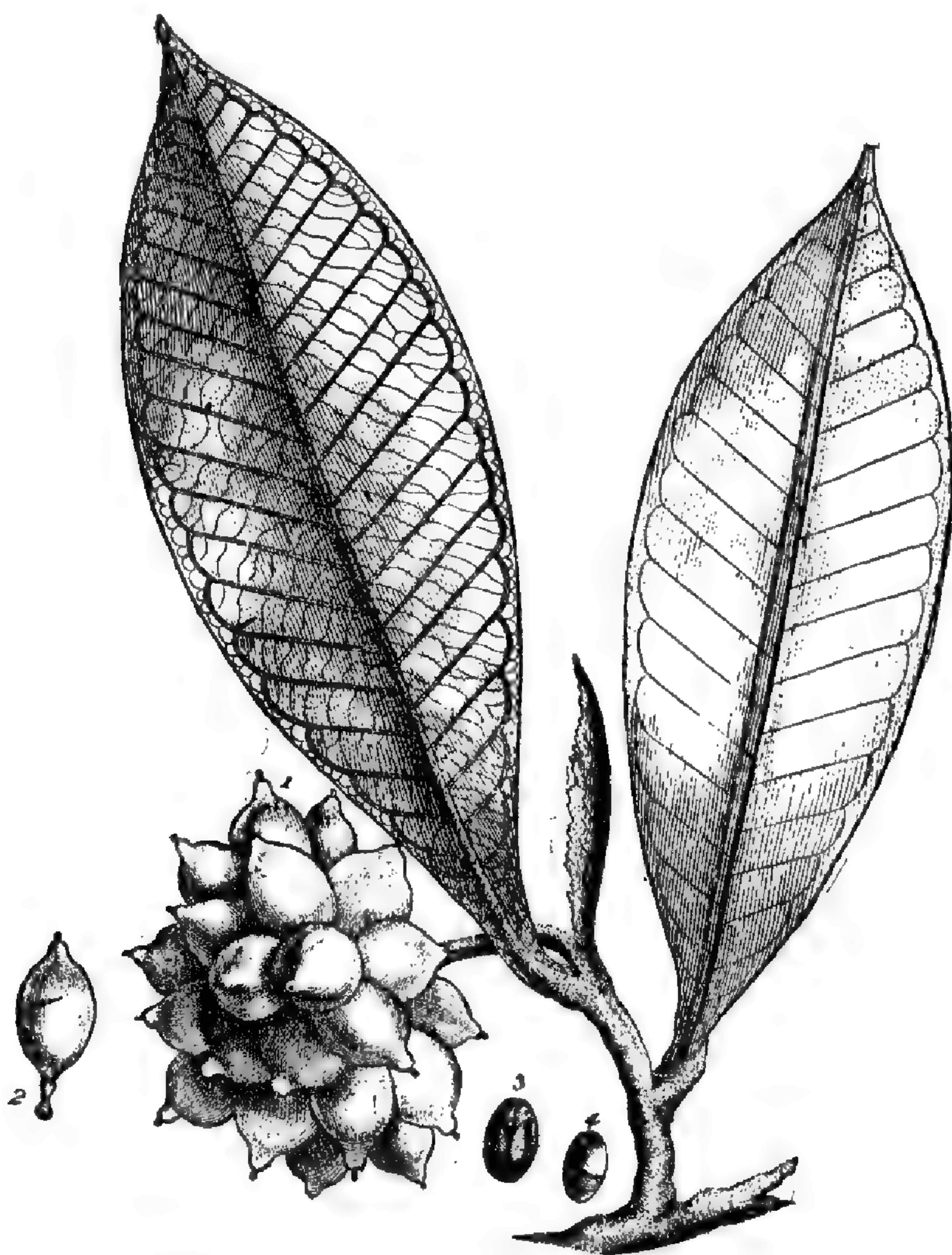


FIG. 71.—*Aberemoa guianensis*. 1, Cluster of carpels; 2, a single pedicellate carpel; 3, seed; 4, endosperm. Scale, $\frac{1}{2}$. Reproduced from Aublet.

minute appressed and longitudinally adnate simple hairs or quite glabrous, pellucid-punctulate, 10 to 22 cm. long by 2 to 6.6 cm. broad, the younger ones more or less pubescent with ferrugineous appressed hairs, especially on the nerves and midrib; petioles 6 to 10 mm. long, grooved above, puberulous; inflorescence extra-axillary or subterminal, composed of 1 to 5 long-pediceled unisexual flowers borne on peculiar specialized flowering branchlets, solitary or in 2's or 3's, invested with small imbricating amplexicaul scabrous distichous bracteoles clothed with ferrugineous hairs; pedicels 1-flowered, filiform, 8 to 12

¹ Don cites "Ruiz & Pavon, Fl. Peruv. [Chil.] 5: pl. 490," a volume hitherto unpublished.

mm. long, ferrugineous-hirtellous, with a bracteole a little below the middle and another at the base; bracteoles small, ovate-lanceolate, ferrugineous-hirtellous; flowers (staminate only observed) 6-petaled, the 3 exterior petals ovate-lanceolate to linear, ferrugineous-sericeous on the outside, 8 to 22 mm. long; inner petals much smaller, ovate, acute, 3 to 4 mm. long, connivent over the andrœcium, at length with their margins revolute; torus conoid; andrœcium composed of many closely crowded stamens 0.6 to 0.7 mm. long, the filament about equal in length to the pollen sacs, minutely appressed-puberulent, the connective not expanded above the pollen sacs nor swollen at the apex but terminating in a few minute hairs; pistillate flowers not observed; fruit bacciform, of the size of an apricot, with its surface scarcely reticulate; seeds about 20 to 25, ovoid-trigonal, olivaceous-brown, 8 mm. long. (PLATE 40. FIGURE 72.)

Type collected by Humboldt and Bonpland. "Crescit in Andibus Quinduen-sibus, alt. 1,200 hex.," Province of New Grenada (Colombia).

DISTRIBUTION: Known only from the type locality and from Copo, in the Andes of Bogota, altitude 1,000–2,000 meters.

SPECIMENS EXAMINED:

COLOMBIA: Copo, Andes of Bogota, *Triana* (Herb. De Candolle).

ECUADOR: "In Huayaquil, 1800," Ruiz (Berlin Herb., type of *Annona conica* Ruiz & Pav.).

LOCAL NAMES: Anon cimarron (Tocaimo and Copo, Colombia).

The close affinity of this plant with *Raimondia monoica* Safford is apparent on comparing the two species; yet the two differ widely in the indument and shape of the leaves and in the size and form of the flowers and fruit. Both species occur in the Andes of Colombia, and in both the flowers are unisexual. The identity of *Annona conica* Ruiz & Pav. with *Raimondia quinduensis* was proved conclusively by a careful study of type material of that species from the Berlin Herbarium, collected at Guayaquil by Ruiz in 1800. Allied to the present species, also, is the plant described by Martius as *Annona tenuiflora*.¹ It has similarly a few fine hairs at the apex of the connective, and its peculiar stamens show that it can not possibly be included in the genus *Annona*. It differs, however, from the genus *Raimondia* as defined by the author in the form of its flowers, in which the inner and outer petals are subequal. The fruit of this species is desired.

EXPLANATION OF PLATE 40.—Photograph of specimen in the De Candolle herbarium as cited. Natural size.

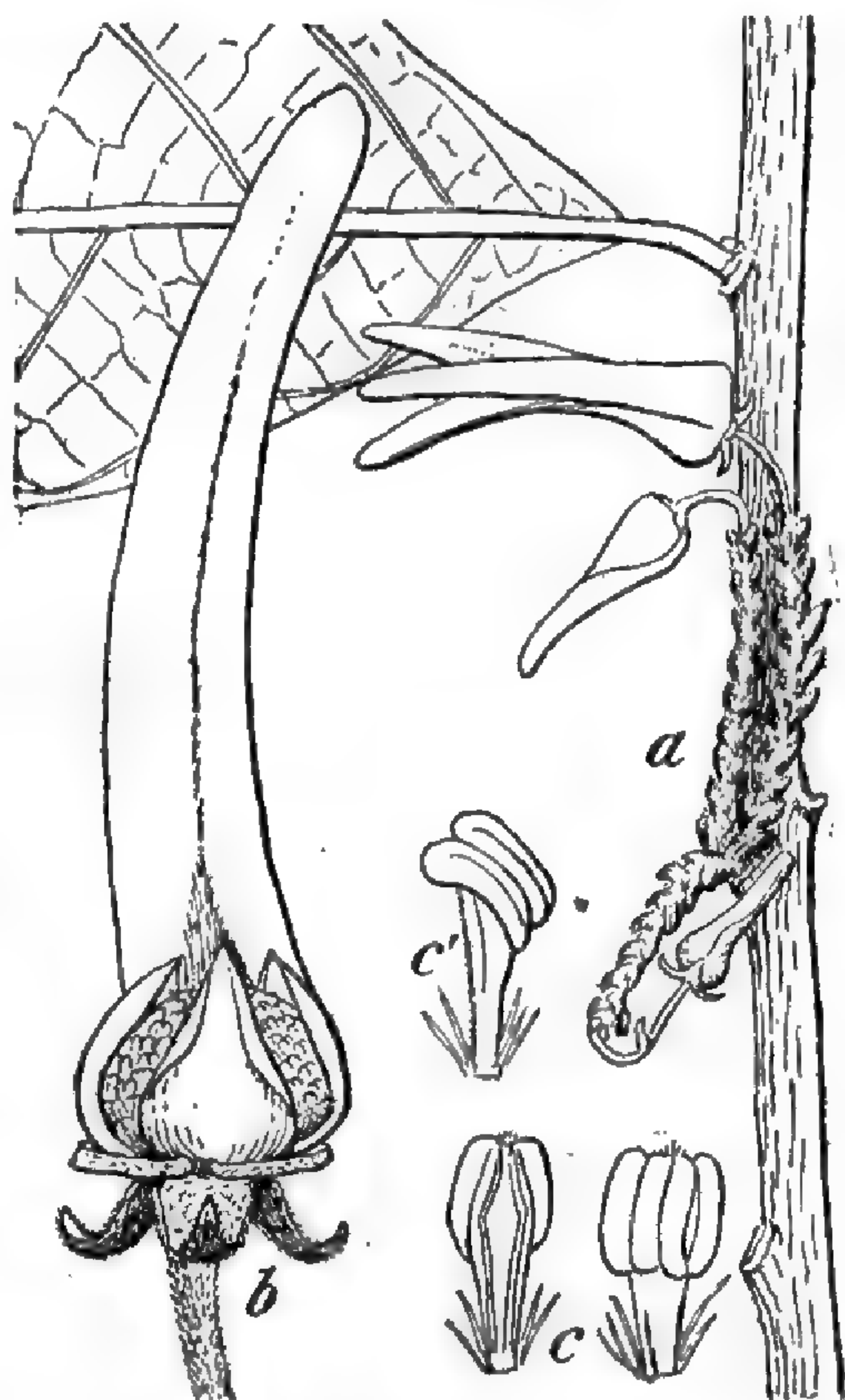


FIG. 72.—*Raimondia quinduensis*. *a*, Inflorescence; *b*, staminate flower, showing inner petals; *c*, stamens; *c'*, stamen, lateral view. *a*, Natural size; *b*, scale 3; *c*, *c'*, scale 20.

¹ Fl. Bras. 13¹: 10. pl. 3. 18.

FUSAEA AND GEANTHEMUM, NEW GENERA.

One noteworthy plant which has been placed under *Duguetia* must undoubtedly be removed from that genus. It was originally described (1775) by Aublet under the name *Annona longifolia*; but Baillon, notwithstanding the fact that the carpels become solidified into a fleshy syncarpium instead of remaining discrete, as in *Duguetia*, that the hairs of the indument clothing its new growth are simple instead of stellate, and that the stamens are radically different from those of the latter genus, placed this plant in the genus *Duguetia*, under the name *D. longifolia*,¹ setting it apart, however, from the rest of the genus under the sectional name *Fusaea*. That it is not congeneric with the plants of the genus *Duguetia* is so evident that the present writer does not hesitate to raise Baillon's section to the dignity of a genus, which must also include *Annona rhombipetala* Ruiz & Pav.

Another plant which must receive generic distinction is *Annona rhizantha* Eichl.² This species, though resembling *Duguetia* in its stellate-hairy and scurfy indument and in the discrete carpels of its fruit, differs radically from it as well as from *Annona* in its peculiar stamens, which closely resemble those of the genus *Raimondia*, in being devoid of an expanded head or swelling at the tip of the connective above the pollen sacs. From *Raimondia* it is separated by the character of its fruit as well as by its indument and the much greater development of the inner petals of its corolla. This plant was placed in the genus *Aberemoa* (*Duguetia*) by Robert E. Fries, who set it apart from the rest of the genus under the sectional name *Geanthemum*. From the peculiarities above noted, however, it is evident that it cannot be included in the genus and the present writer feels compelled to raise Fries's section to generic dignity.

FUSAEA (Baill.) Safford, gen. nov.

Duguetia, section *Fusaea* Baill. *Adansonia* 8: 326. 1868.

Stem subsarmentose, branching, the younger parts, including petioles and peduncles, clothed with simple hairs; flowers perfect; calyx relatively large, 3-parted, the lobes sometimes separate nearly to the base, sometimes united for a great part of their length and irregularly torn in anthesis (Sagot); leaves alternate, entire; flowers (fig. 73) perfect; petals large, sericeous-pilose, all imbricate, ovate-spatulate, the inner ones somewhat larger than the outer; outer row of stamens sterile, converted into small obovate imbricated petaloid appendages surrounding the andrœcium; inner stamens fertile, with the connectives dilated at the apex over the pollen sacs; fruit (syncarpium) globose,

¹ *Adansonia* 8: 327. 1868.

² *Jahrb. Bot. Gart. Mus. Berlin* 2: 320. *pl.* 11. 1883.

smooth, areolate, composed of many carpels fused together in a solid mass; seeds small, surrounded by edible pulp.

Type species, *Fusaea longifolia* (Aubl.) Safford.

The distinctive characters of the type of this genus were first noted by Baillon, who pointed out that its fruit (fig. 74), instead of being composed (as in *Duguetia* of distinct woody carpels, inserted in cavities in the hardened torus, is a solid mass, "une véritable boule de bois, sans aspérités de la surface rappelant la présence de ses nombreux carpelles;" and that the outer stamens are modified into "lamelles pétaloïdes, imbriquées, longuement obovées;"¹ and Robert E. Fries, who followed Baillon in regarding *Fusaea* as the section of a genus (*Aberemoa*), says that "this section departs in so many respects from the remaining ones, that it should perhaps be regarded as a special genus," and that in its fruit it bears a great resemblance to the genus *Annona*. The synonymy, which the elevation of this section to generic rank entails, and a brief description are as follows:



FIG. 73.—Flower of *Fusaea longifolia*. Showing petaloid outer stamens. Reproduced from Baillon.

Fusaea longifolia (Aubl.) Safford.

Annona longifolia Aubl. Pl. Guian. 1: 615. pl. 248. 1775.

Duguetia longifolia Baill. Adansonia 8: 327. 1868.

Aberemoa longifolia Baill. Hist. Pl. 1: 205. f. 233-235. 1868.

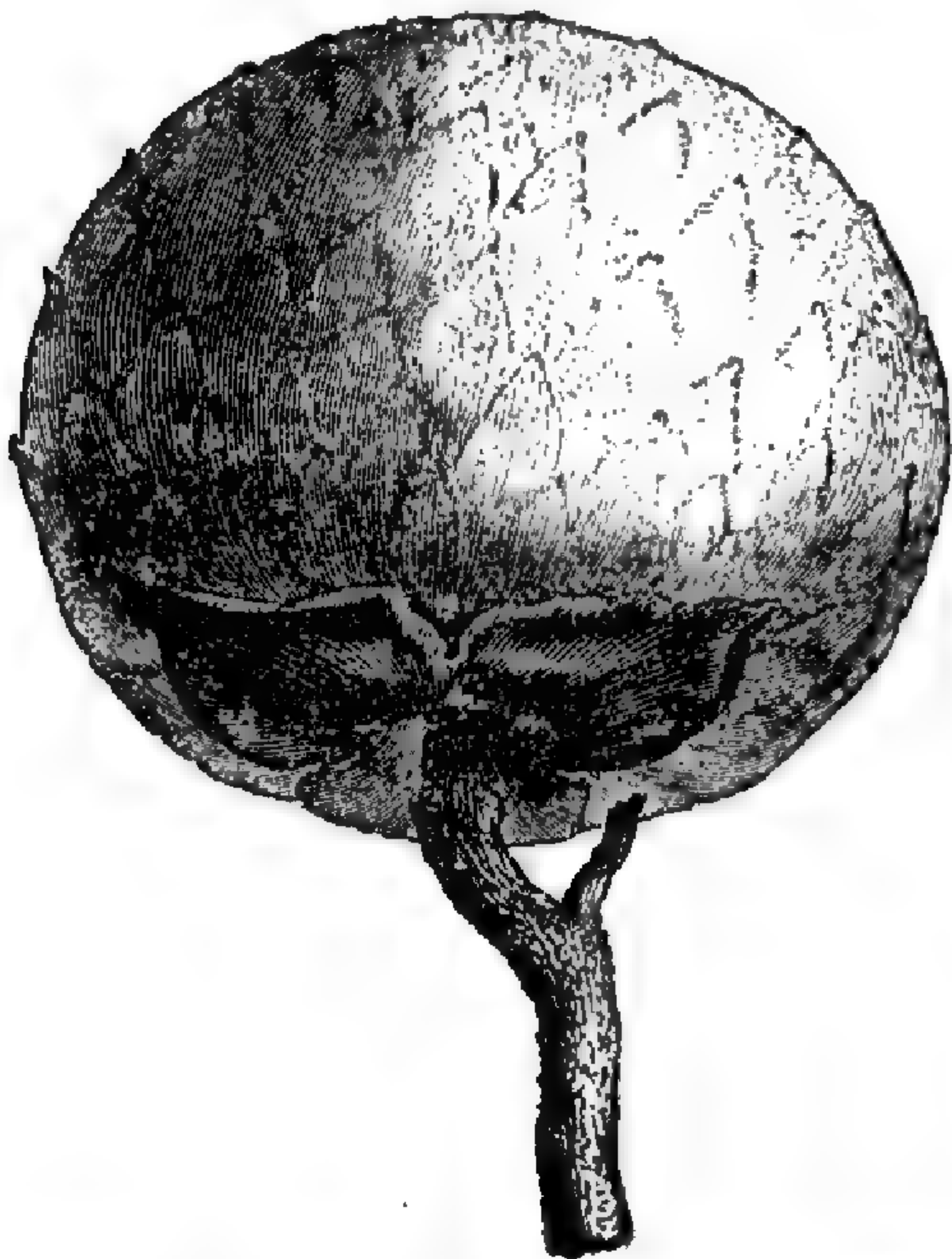


FIG. 74.—Concrete fruit of *Fusaea longifolia*. Reproduced from Baillon.

A tree or shrub; leaves very short-petioled, oblong-lanceolate (25 cm. long and 8 cm. broad), obtuse or shortly tapering at the base, long-acuminate at the apex, above smooth, with midrib and nerves impressed, below the latter very prominent, sparsely hairy; flowers extra-axillary, long-peduncled, solitary or in pairs; peduncles bearing one or two bracteoles; calyx gamosepalous, deeply 3-lobed, the lobes ovate-acute, ferruginous-hirtellous on the outside; corolla broad, widely spreading; petals 6, in 2 rows, purplish, imbricate, sericeous-pilose, ovate-spathulate or oblong with the apices obtusely cuneate, the inner somewhat longer and narrower than the outer; stamens numerous, the outer sterile, petaloid, imbricated, the inner perfect, with the tips of the connectives expanded above the pollen sacs as in the typical *Annonas*; fruit about the size of an orange, globose, smooth, areolate

but without protuberances; seeds small surrounded by a red edible pleasantly flavored pulp. (FIGURES 73, 74.).

¹ Baill. op. cit. page 326.

Type collected by Aublet on the banks of the Crique des Galbis, French Guiana, in the month of May.

DISTRIBUTION: Rather frequent in the forests of French Guiana, but difficult to collect (Sagot).

"This tree," says Aublet, "is called Pinaïoua by the Garipons and the Galibis [Caribs]. They eat the fruit with delight, and it is of very good flavor."

GEANTHEMUM Safford, gen. nov.

Aberemoa, section *Geanthemum* R. E. Fries, Vet. Akad. Handl. Stockholm 34⁵: 24. 1900.

Arborescent, the younger parts clothed with stellate-lepidote indument; inflorescence for the most part issuing from slender subterranean branches;



FIG. 75.—*Uvaria sessilis*. Inflorescence, stamens, and fruit. After Velloso. Scale $\frac{1}{2}$.

flowers hermaphrodite, 1 to several borne on a common peduncle or lateral branchlet bearing many small scalelike bracts; calyx 3-parted, stellate-lepidote on the outside; corolla 6-petaled in 2 series, the outer petals open in estivation, the inner ones imbricate; stamens all fertile, their connectives not swollen, produced, nor dilated above the two short sessile pollen sacs; pistils (carpels) free in the flower, the ovary with a single basal ovule, as in *Annona*, the style terminating in an incurved, acuminate or linear, glabrous stigma; fruit composed of closely crowded but distinct carpels, easily separable, as in the genus *Duguetia*; seeds resembling those of *Annona*. (PLATE 41.)

Type species, *Geanthemum rhizanthum* (Eichl.) Safford.

This genus resembles *Raimondia* in the form of its stamens, but differs from it in having bisexual flowers, fruit with easily separable carpels, and a stellate-lepidote indument. In the two latter features

it resembles *Duguetia*, but it differs radically from that genus and from *Annona* in its peculiar stamens. In this genus are included the following two species:

Geanthemum rhizanthum (Eichl.) Safford.

Anona rhizantha Eichl. Jahrb. Bot. Gart. Mus. Berlin 2: 320. pl. 11. 1883.

Aberemoa rhizantha R. E. Fries, Vet. Akad. Handl. Stockholm 34⁵: 24. 1900.

Duguetia rhizantha Huber, Bol. Mus. Paraense 5: 356. 1908.

Type collected near Cascadura, in the mountainous region of Serra da Bica, Province of Rio de Janeiro, Brazil, in January, 1882, by Gustavus Peckolt.

EXPLANATION OF PLATE 41.—Reproduction of drawings of type after Eichler. 1, Trunk with rootlike flowering branches; 2, leaf; 3, diagram of flower; 4, inflorescence; 5, inflorescence branchlet, showing distichous bracteole scars; 6, longitudinal section through

the flower, showing gynœcium, torus with stamens, base of a petal (*p*), and a sepal (*s*); 7, petals from within; *a*, outer petal; *b*, inner petal with excavated base; 8, *a*, stamen dorsal view, showing two pollen sacs; *b*, stamen, ventral view; 9, fruit; 10, same in cross section, showing ruminant albumen of seeds. Fig. 1, much reduced; fig. 2, scale $\frac{1}{2}$; figs. 3, 5, 6, scale 3; figs. 4, 7, 9, 10, natural size; fig. 8, scale about 6.

Geanthemum cadavericum (Huber) Safford.

Duguetia cadaverica Huber, Bol. Mus. Paraense 5: 356. 1908.

Type collected in the moist primeval forests between the rivers Cumaná-mirim and Ariramba, December 18, 1906, by A. Ducke (no. 7995).

Closely allied to these two species and probably congeneric with them is a plant described and figured by Velloso under the name of *Uvaria sessilis*¹ (fig. 75), which Martius erroneously regarded as a synonym of his *Duguetia bracteosa*. If the two species were identical, the specific name of Velloso would take precedence. As seen in Velloso's figure, however, both the leaves and flowers of his plant bear a close resemblance to those of *Geanthemum rhizanthum* and apparently represent a closely allied form. The fruit of *Duguetia bracteosa* has never been figured, but it is described by Martius as equal in size to the nut of *Juglans regia*, globose, with about 30 to 40 pentagonal obovate carpels, mucronate with the persistent style, and of a scarlet to brownish color. The type locality of *D. bracteosa* is the primeval forests of the Province of Bahia, near St. George of the Islands. The flowering branch of a plant in the Museum of St. Petersburg identified as *Duguetia bracteosa*, collected by Riedel at Castelnovo, Province of Bahia (no. 493), and figured by Robert E. Fries,² shows the inflorescence bearing large, persistent, sessile, ovate bracts which are absent from Velloso's figure of *Uvaria sessilis*. Martius was then, in all probability, mistaken in regarding the latter species as identical with the former, the fruit of which is described as being subtended by a persistent involucre.

ADDENDUM.

Annona praetermissa Fawc. & Rendle.

Annona praetermissa Fawc. & Rendle, Journ. Bot. Brit. & For. 52: 74. 1914.

Annona jamaicensis Sprague (in part), Bull. Herb. Boiss. II. 5: 701. 1905.

Annona jamaicensis Safford (in part), Contr. U. S. Nat. Herb. 16: 274. pl. 99. 1913.

Type collected on Craig Hill, near Gordon Town, St. Andrew Parish, Jamaica, June, 1902, by W. Fawcett.

Under the name *Annona jamaicensis* at least two species have been included, growing wild in the mountains of Jamaica. *Annona jamaicensis*, based upon *Annona sericea* Griseb. (not Dunal), was described by Sprague from specimens collected (1) by William Purdie, in 1844, near Bath, at the eastern extremity of the island; (2) by William Thomas March, who lived at Spanish Town (nos. 4, 7, 1571, without definite locality, collected in 1849-50); (3) by Alexander Prior, who collected in the Blue Mountains, in the eastern portion of Jamaica, and in the vicinity of Moneague, near the central part of the island north of the dividing ridge (locality not cited). Of these specimens it is probably Prior's which Grisebach referred to *Annona sericea*, since duplicates of Prior's collections were in Grisebach's Herbarium. This is the plant figured by the writer in volume 16 of the Contributions, plate 98, with subglobose flower bud.

¹ Fl. Flum. 238. 1825. Atlas 5: pl. 125. 1827.

² Arkiv Bot. 5⁴: pl. 1. f. 6, 1905.

A second species, with obpyriform or pyramidal, acuminate flower buds and long, narrow petals, figured by the writer under the name *Annona jamaicensis*, as cited in the above synonymy, has recently been described by Fawcett and Rendle as *Annona praetermissa*. The specimen from which the figure was drawn was received by the writer from its collector, Mr. William Harris, who found it growing on Sheldon Road, St. Andrew, at an altitude of 750 meters, September 10, 1897 (no. 6861). It was distributed under the name of "*A. jamaicensis* Sprague." Its single flower differed greatly from that of *A. jamaicensis* as described by Sprague and as observed on Prior's specimen in the Gray Herbarium. This led the writer to ask for further material, in a letter to Mr. Harris, dated November 29, 1912, in which he made the following notes and queries:

Annona jamaicensis, as described by Sprague (*A. sericea* Griseb. non Dun.), has ovate petals 11 to 12 mm. long and 8 mm. broad, while in the specimen collected by you the flower has quite a different shape, with linear-oblong petals 23 mm. long and 6 mm. broad. The fruit of your specimen and also the seeds are larger than those described by Sprague. * * * The cotype of *A. jamaicensis* in the Gray Herbarium has a single globose flower, like that shown in the accompanying figure. Can it be that specimens seen by Sprague had only immature flowers; or is it possible that there are two similar wild *Annonas* growing in the mountains of Jamaica, one with globose buds and broadly ovate petals, the other with elongate buds like those of *A. reticulata* and linear-oblong, or broadly linear petals? * * *

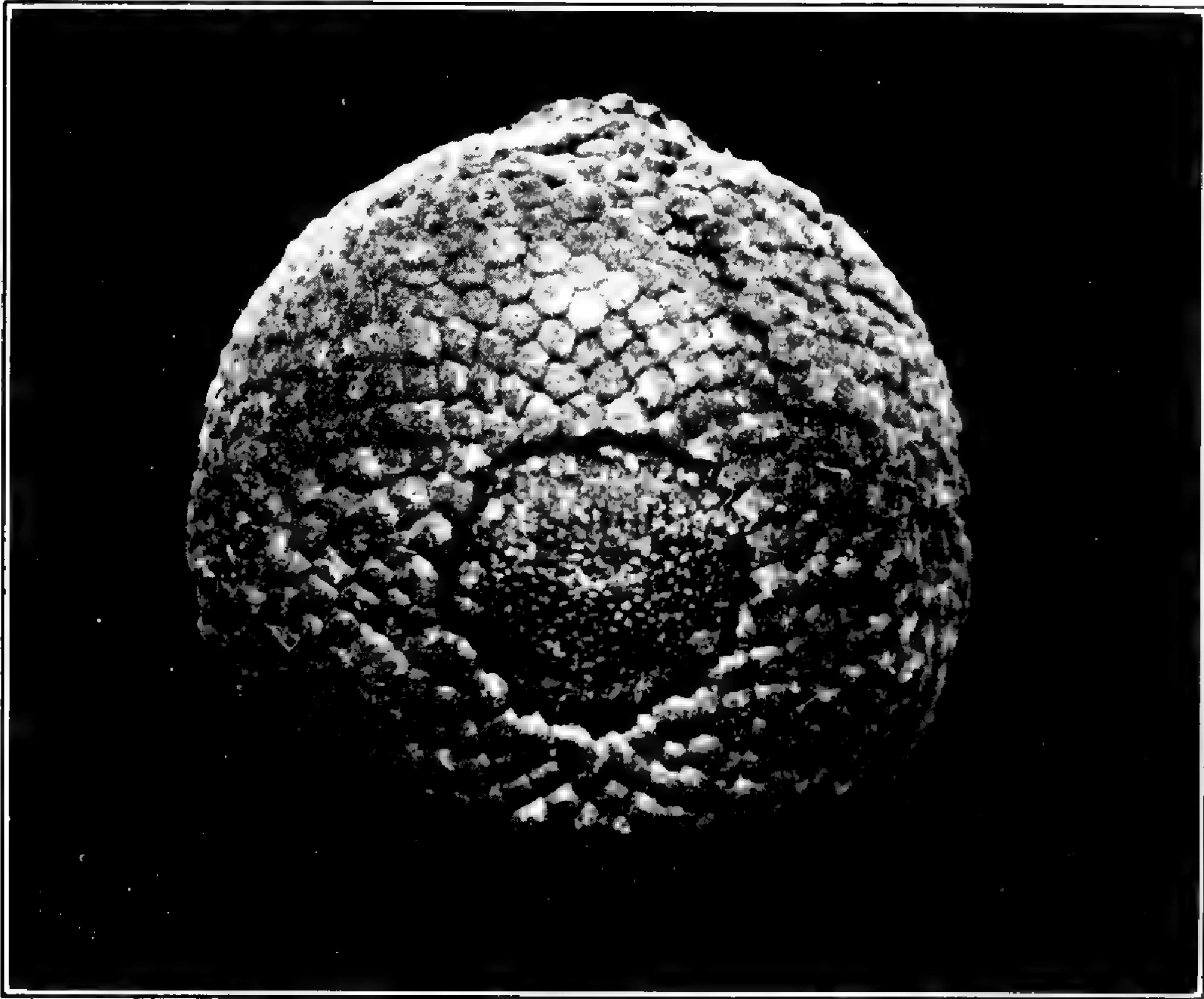
Mr. Harris had at this time no further material available; but on October 13, 1913, he sent a number of fine specimens with abundance of flowers, both immature and mature (collected June 25, 1913, near Petersfield, St. Andrew, no. 11,648). This new material showed by the acuminate, pyramidal or obpyriform buds that it represented a species distinct from *Annona jamaicensis*, but it was too late to make any changes in the writer's paper on "*Annona sericea* and its allies." The writer then sent a photograph of Alexander Prior's specimen of *A. jamaicensis* to Mr. Harris,¹ and once more called his attention to the marked difference between it and the specimens collected by Mr. Harris. In a letter dated December 19, 1913, Mr. Harris acknowledged the receipt of the photograph and conceded it to be quite possible that the specimen represents another species.

Annona praetermissa may be properly called the "wild chirimoya of Jamaica." It must not only be separated from *A. jamaicensis*, but it must take its place with *A. cherimola* Mill., *A. longiflora* S. Wats., and their allies in the section *Atta*. It is described as having 3-petaled flowers, but like *A. cherimola* it has in addition to the three outer elongated petals three minute inner petals, ovate in shape, not exceeding half the length of a stamen, and clothed with tomentum. These are so small that they can be seen only with the aid of a lens; so that it is not strange that, like those of the chirimoya (first described as *Annona tripetala*), they should have escaped observation. The close affinity of this species with *A. cherimola* Mill. is shown by its flowers, fruit, and leaves. As in the latter species, the flowers never open widely. They are solitary or geminate and are extra-axillary or leaf-opposed. The fruit is distinctly areolate, resembling that variety of chirimoya in which the areoles are concave; and each areole bears a mammiform tubercle slightly incurved or hooked at the tip. The leaves, persistently pubescent beneath, are often relatively narrower than those of a typical chirimoya leaf, and are chiefly to be distinguished by the reddish brown midrib and lateral nerves which are conspicuously contrasted with the dull greenish color of the remainder of the lower surface.

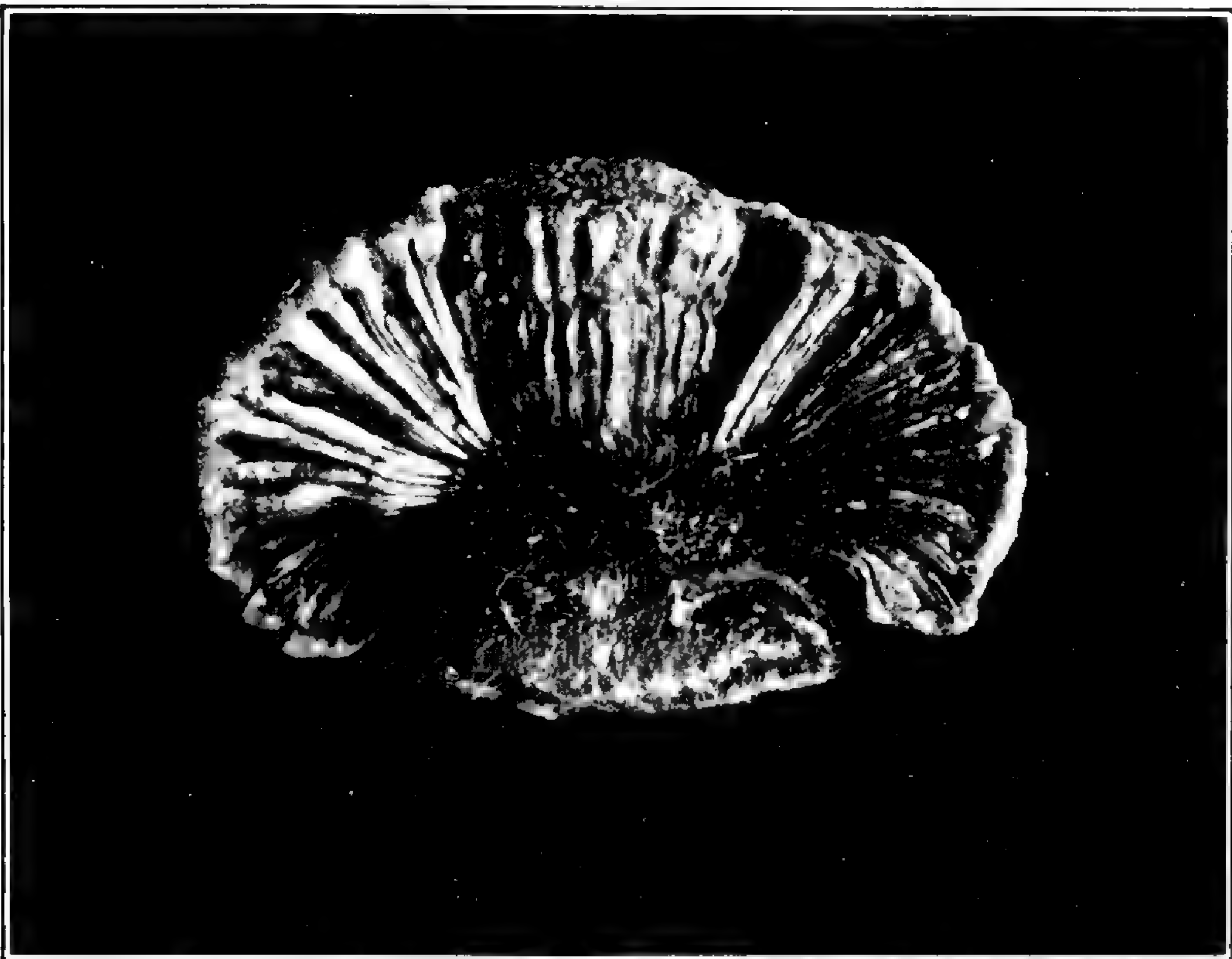
¹ See loc. cit. pl. 98.



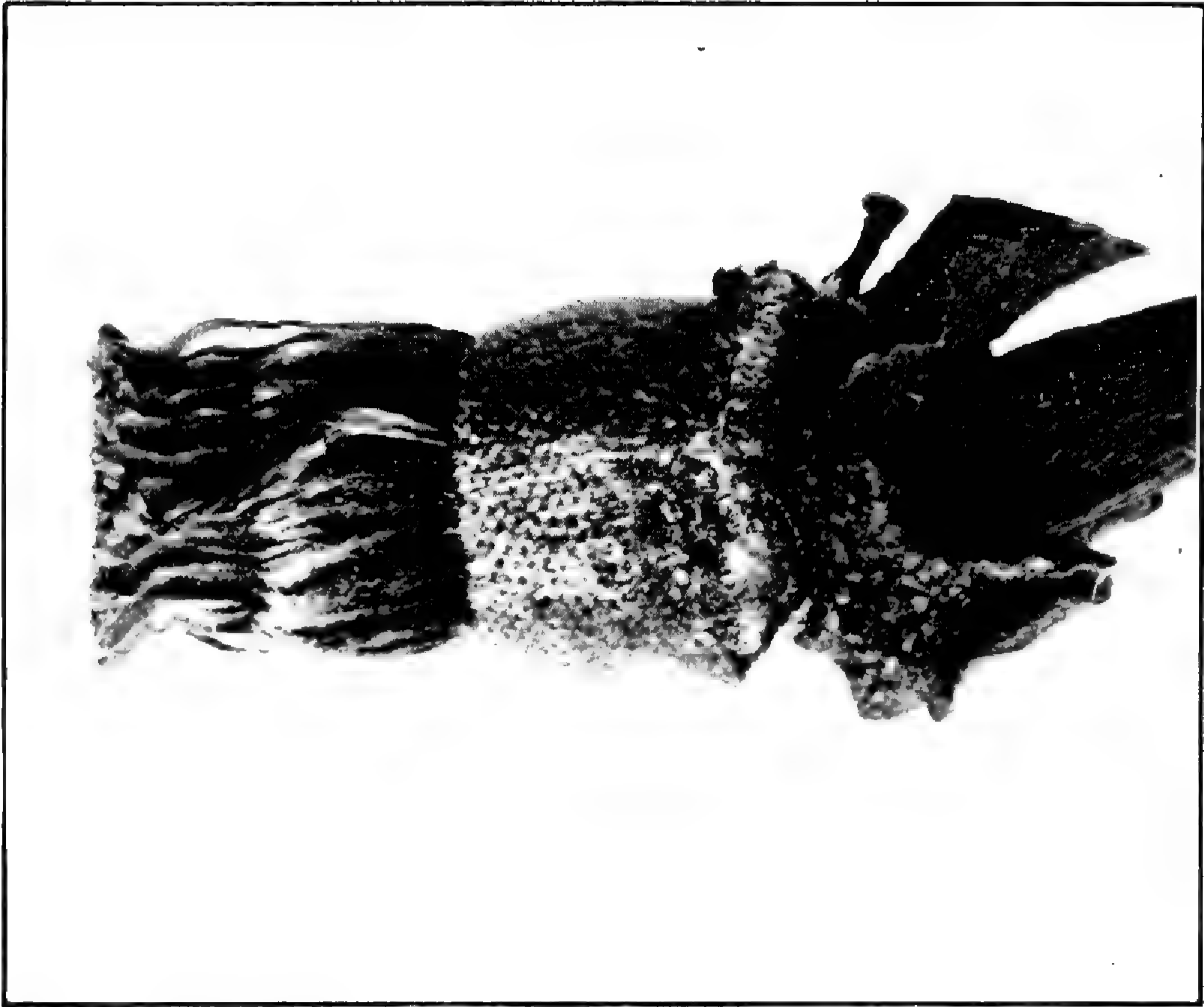
ANNONA MURICATA L.



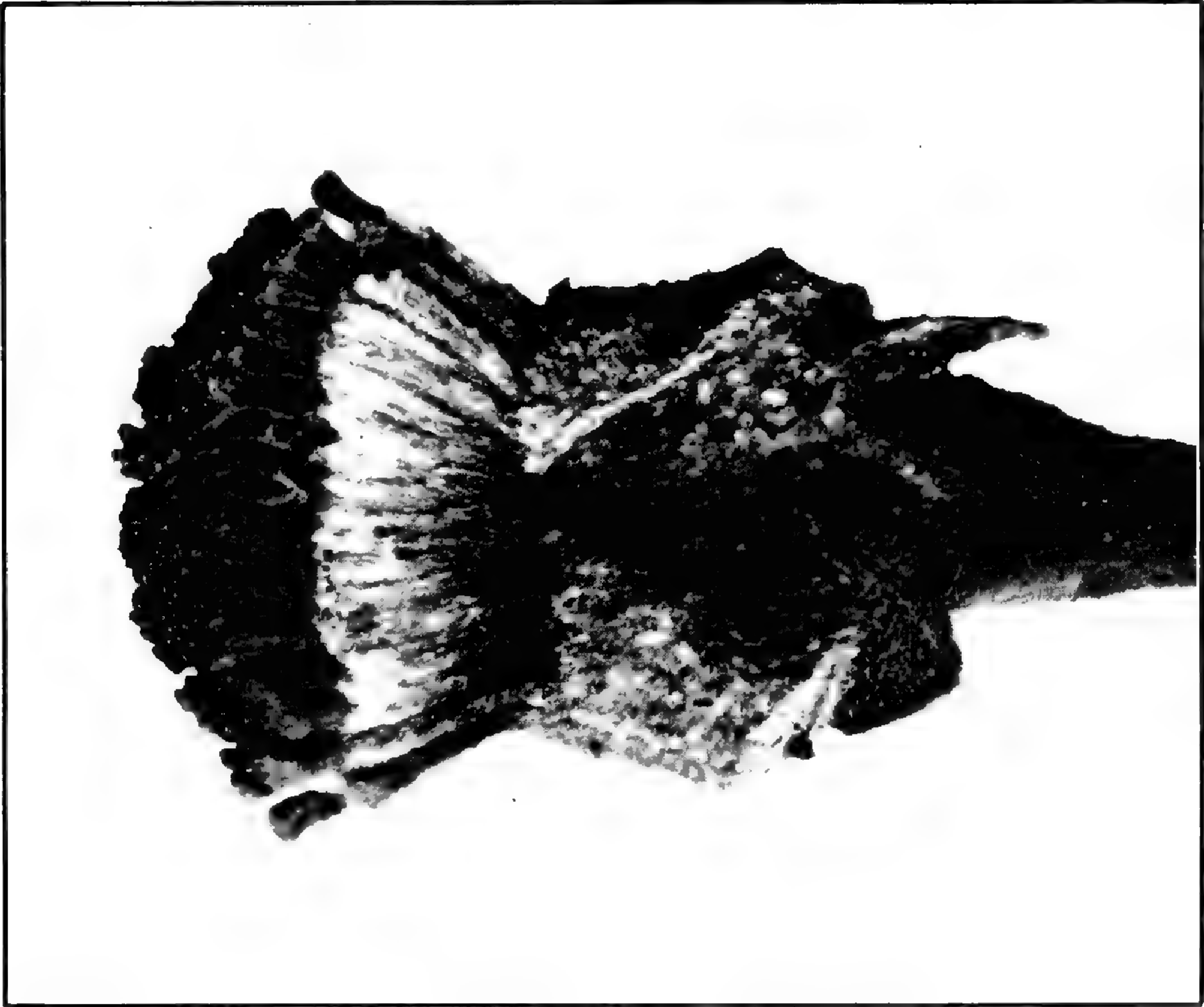
A. REPRODUCTIVE ORGANS OF ANNONA PURPUREA MOC. & SESSÉ.



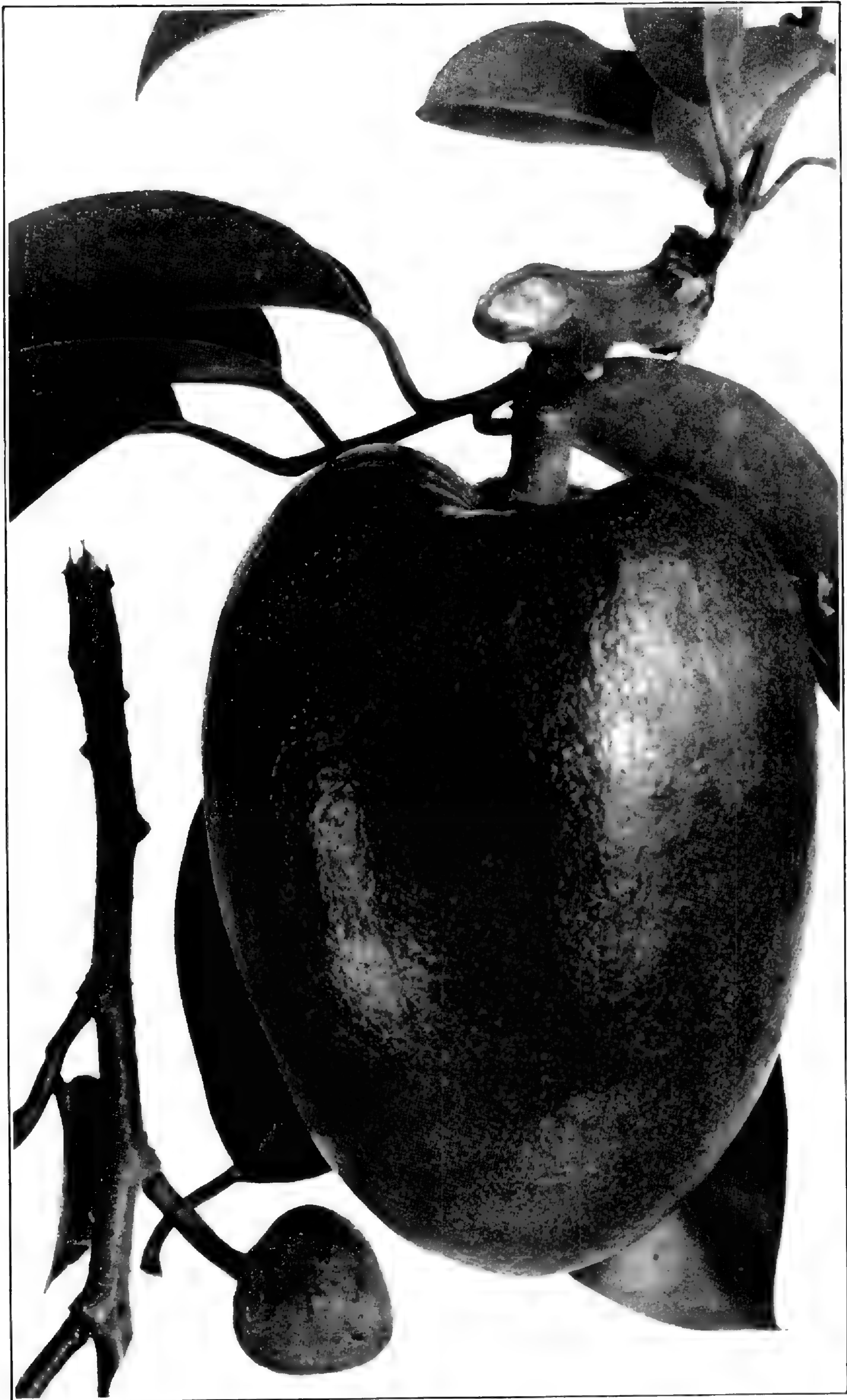
B. REPRODUCTIVE ORGANS OF ANNONA PURPUREA MOC. & SESSÉ.



B
GYNOECIUM OF *ANNONA MONTANA* MACFAD.



A
GYNOECIUM OF *ANNONA MURICATA* L.



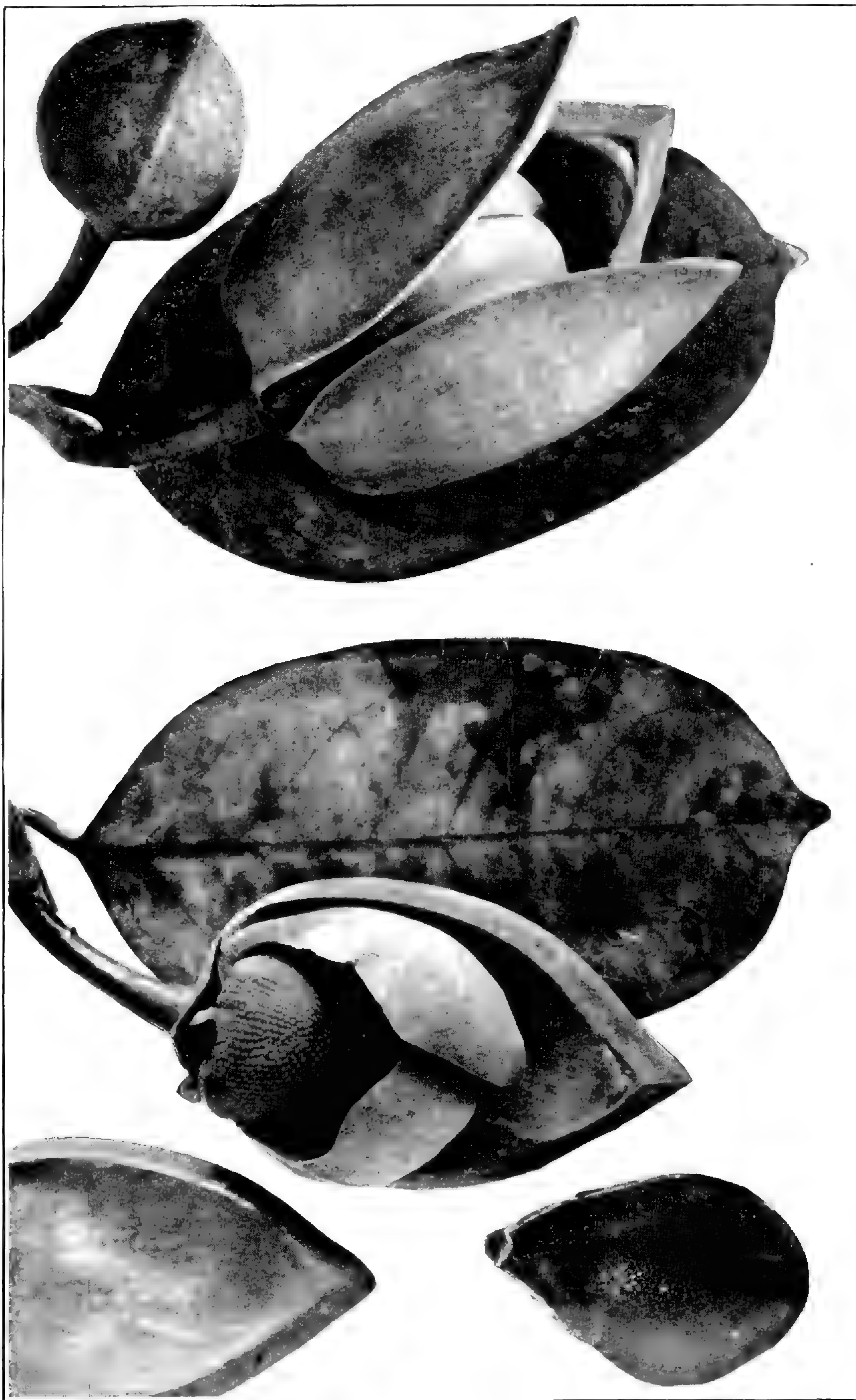
ANNONA GLABRA L., THE ALLIGATOR APPLE.



A. FRUIT OF ANNONA DIVERSIFOLIA SAFFORD.



B. FRUIT OF ANNONA DIVERSIFOLIA SAFFORD.



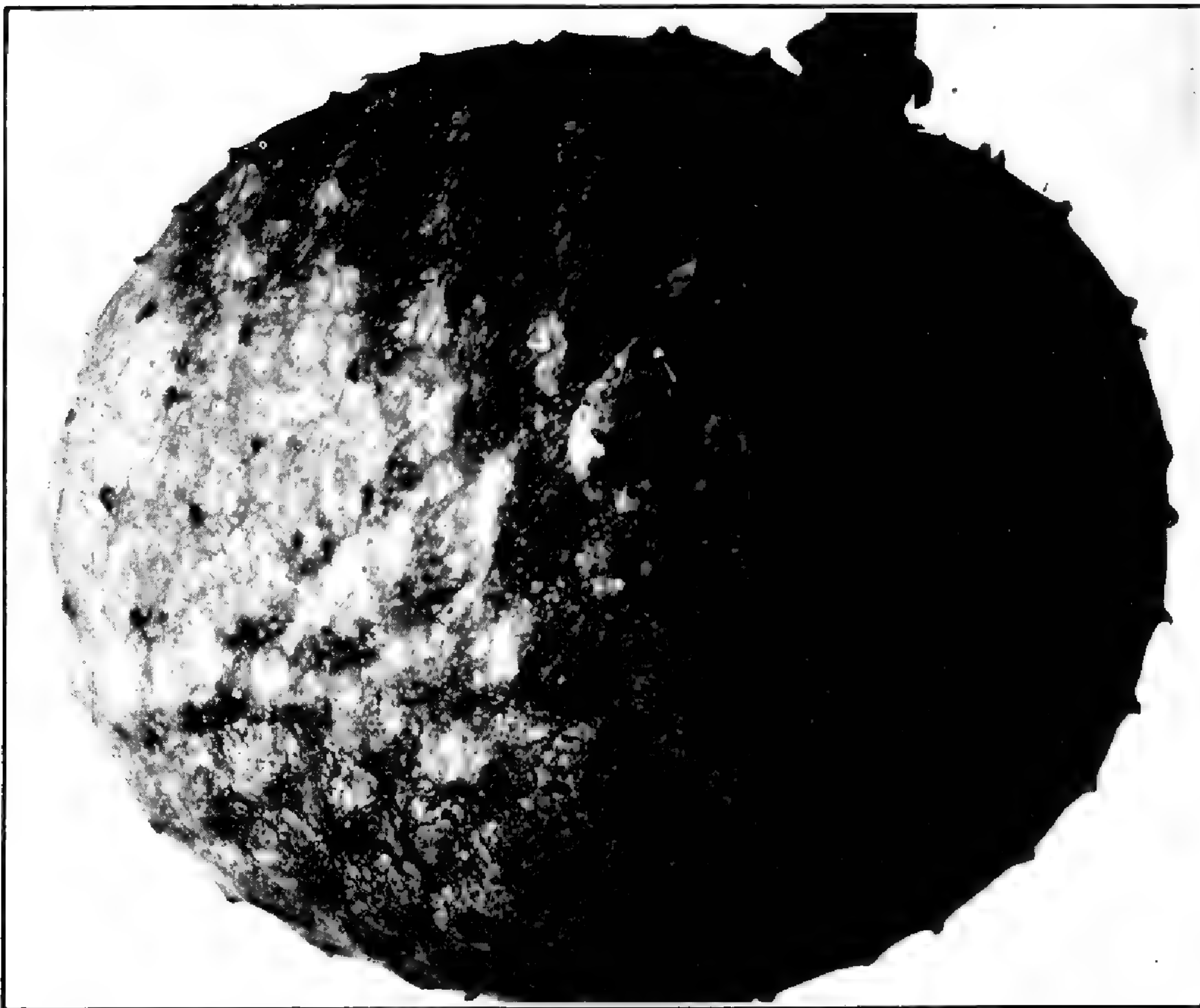
FLOWERS OF *ANNONA MONTANA* MACFAD., FROM PORTO RICO.



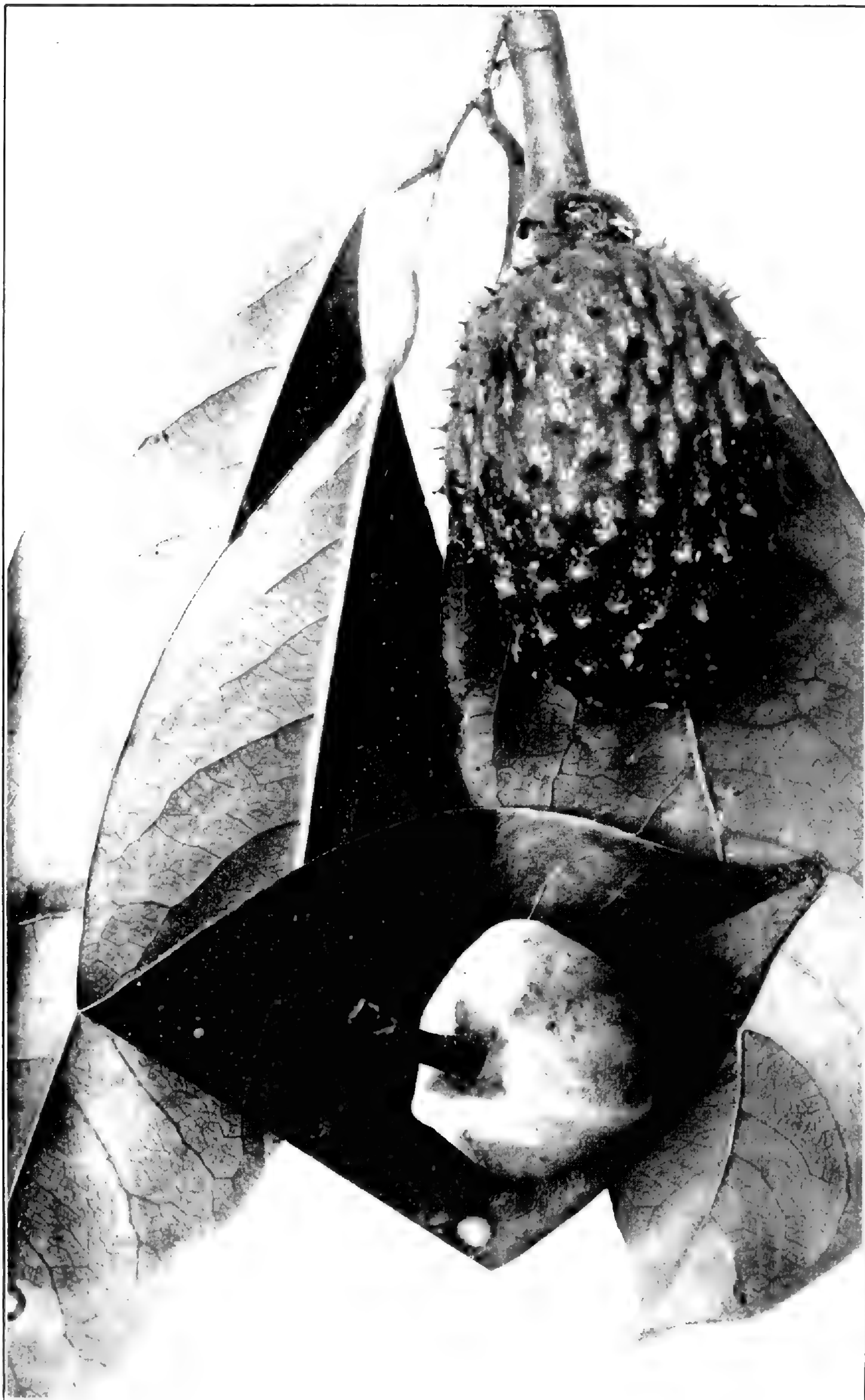
SOLITARY FRUIT AND LEAVES OF *ANNONA MONTANA* MACFAD.



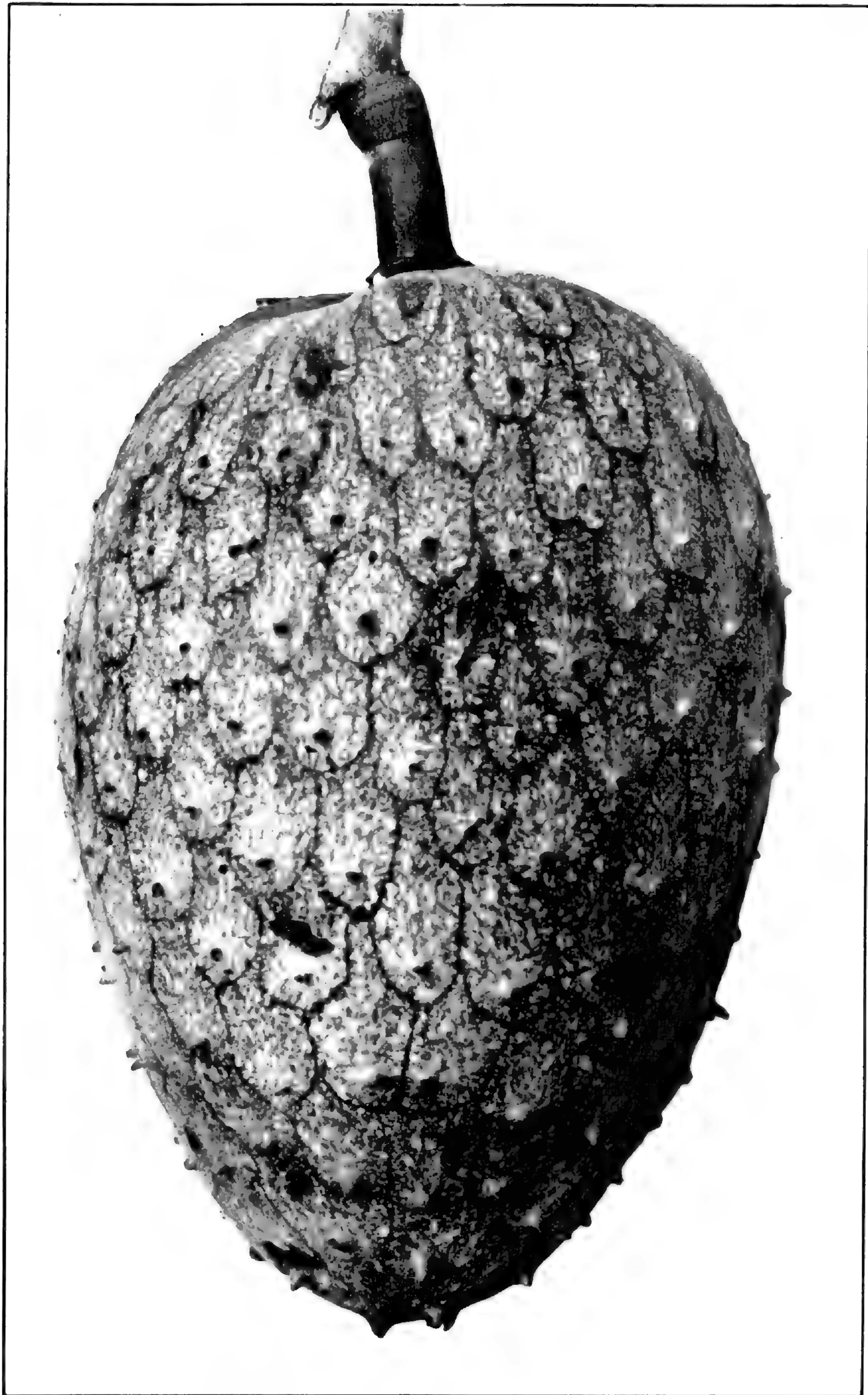
A. GEMINATE FRUIT OF *ANNONA MONTANA* MACFAD., FROM PORTO RICO.



B. FRUIT OF *ANNONA SPHAEROCARPA* SPLITG., FROM PARIMARIBO, SURINAM.



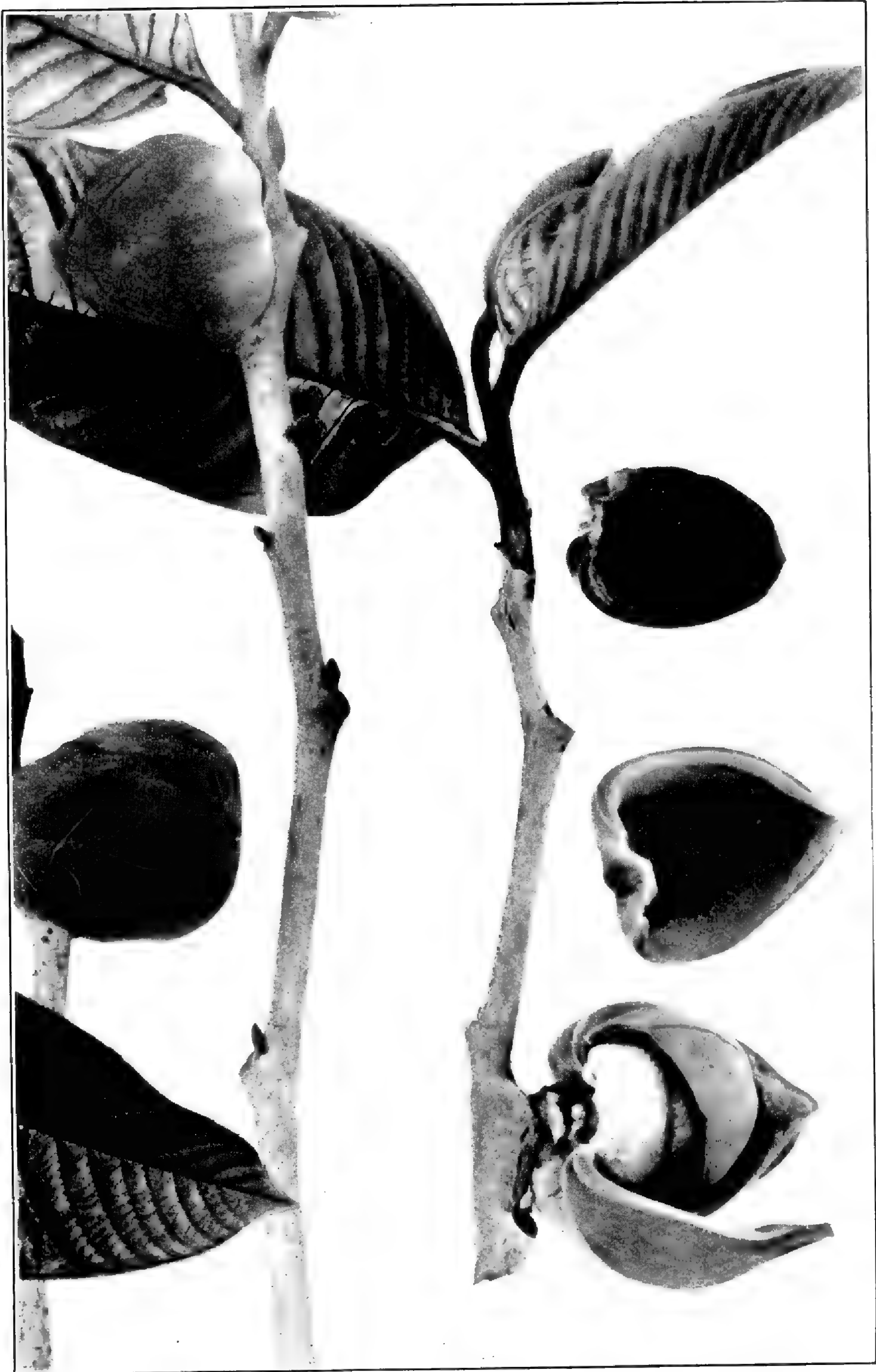
YOUNG FRUIT AND FLOWER OF *ANNONA MARCGRAVII* MART., FROM VENEZUELA.



FRUIT OF *ANNONA MARCGRAVII* MART., FROM VENEZUELA.



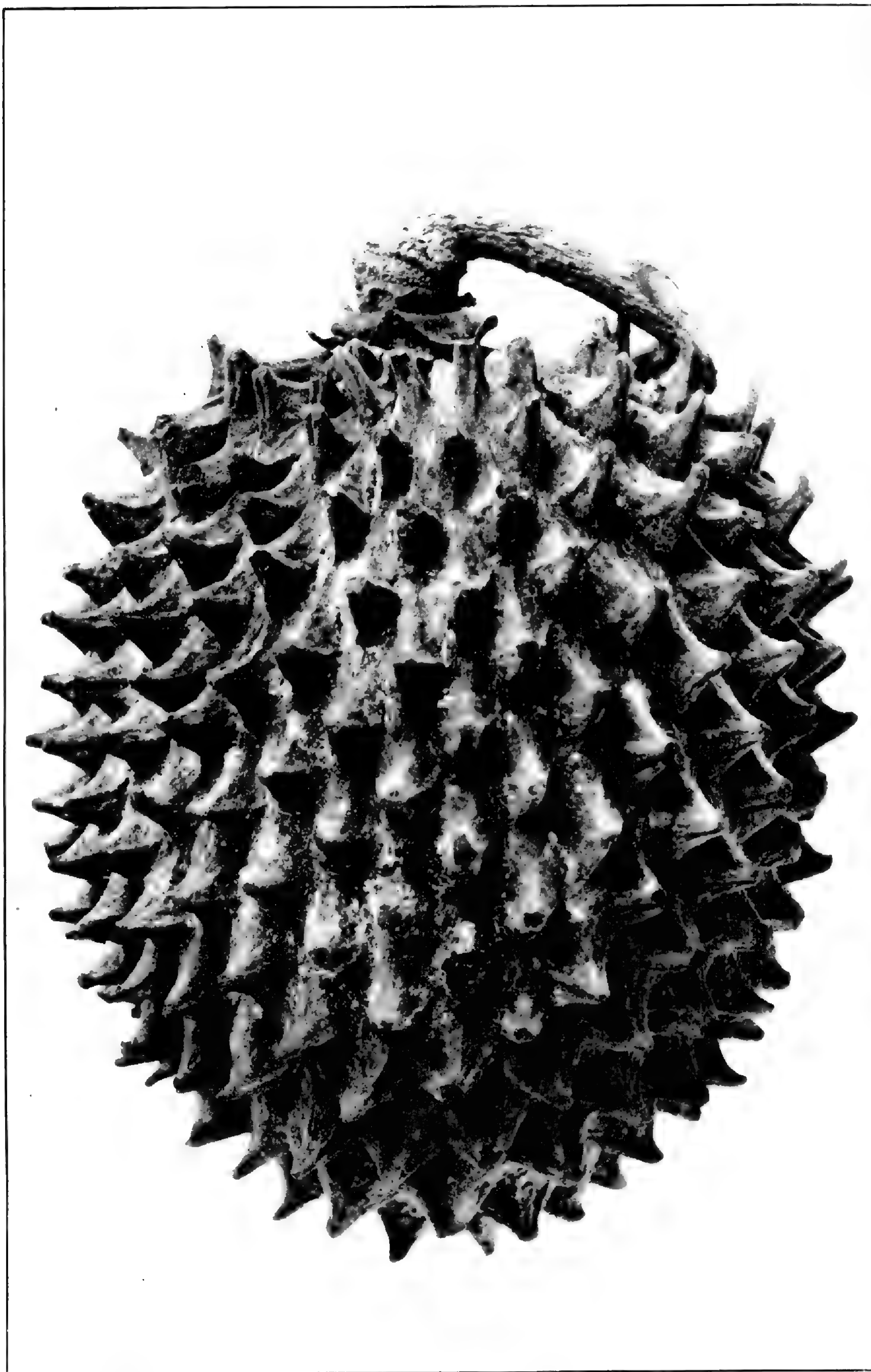
TYPE SPECIMEN OF *ANNONA SALZMANNI* A. DC.



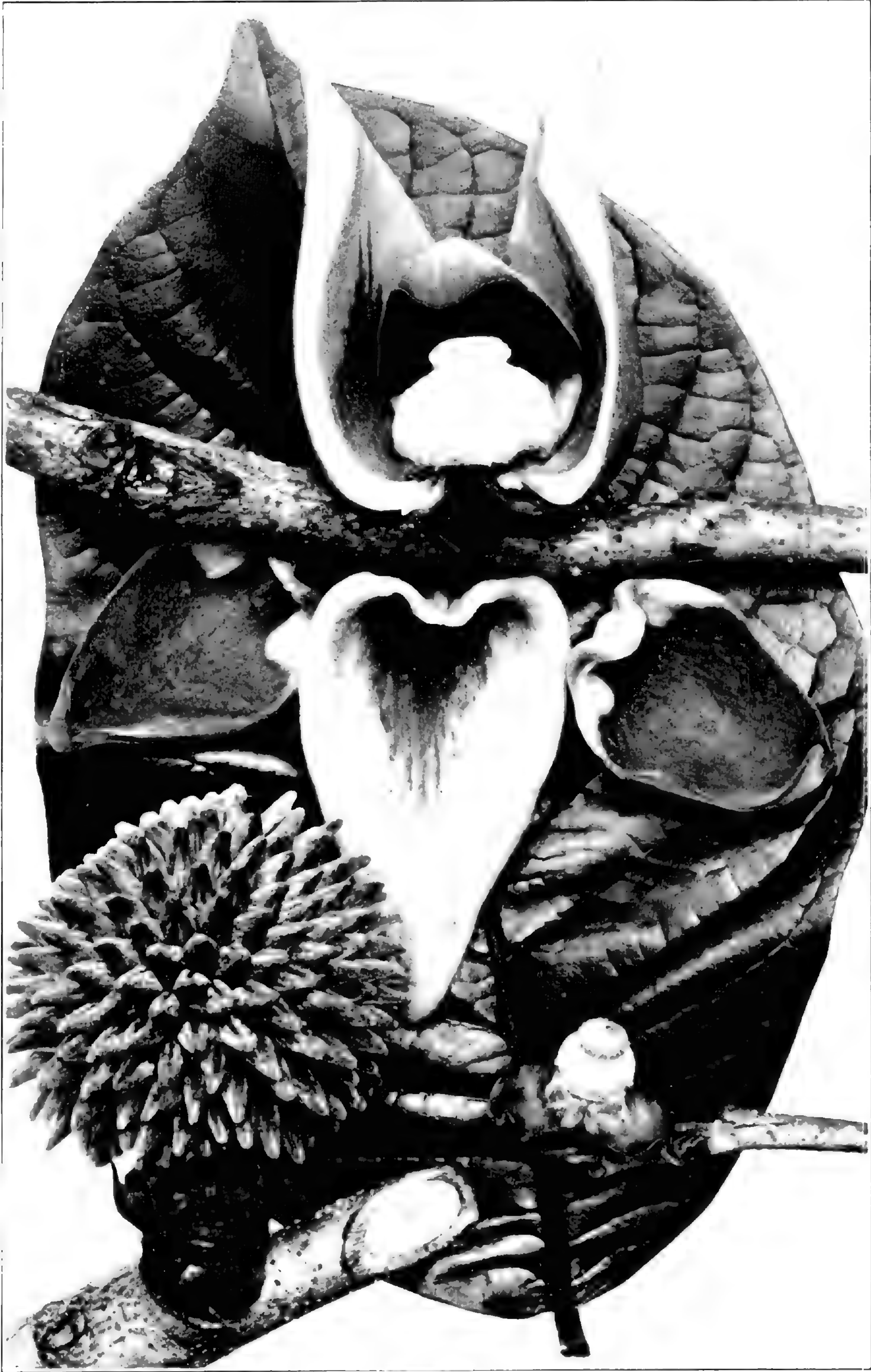
YOUNG FLOWERS AND LEAVES OF *ANNONA PURPUREA* MOC. & SESSÉ, FROM COSTA RICA.



ANNONA PURPUREA MOC. & SESSÉ, WITH MATURE FLOWER, FROM VENEZUELA.



FRUIT OF *ANNONA PURPUREA* MOC. & SESSÉ, FROM PANAMA.



ANNONA INVOLUCRATA BAILL.



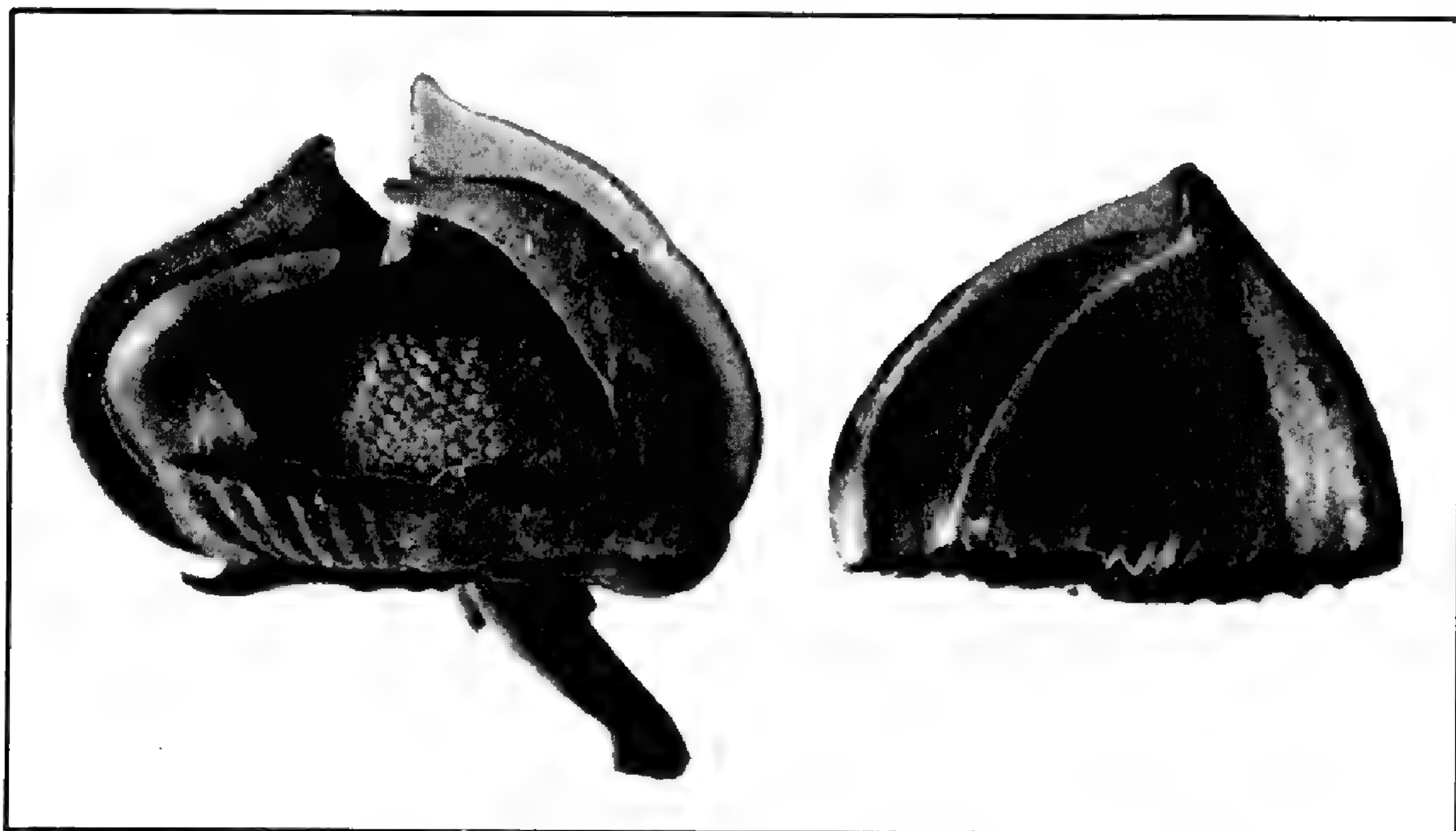
BRANCH OF ANNONA INVOLUCRATA BAILL., SHOWING FLORAL INVOLUCRE.



ANNONA PALUDOSA AUBL.



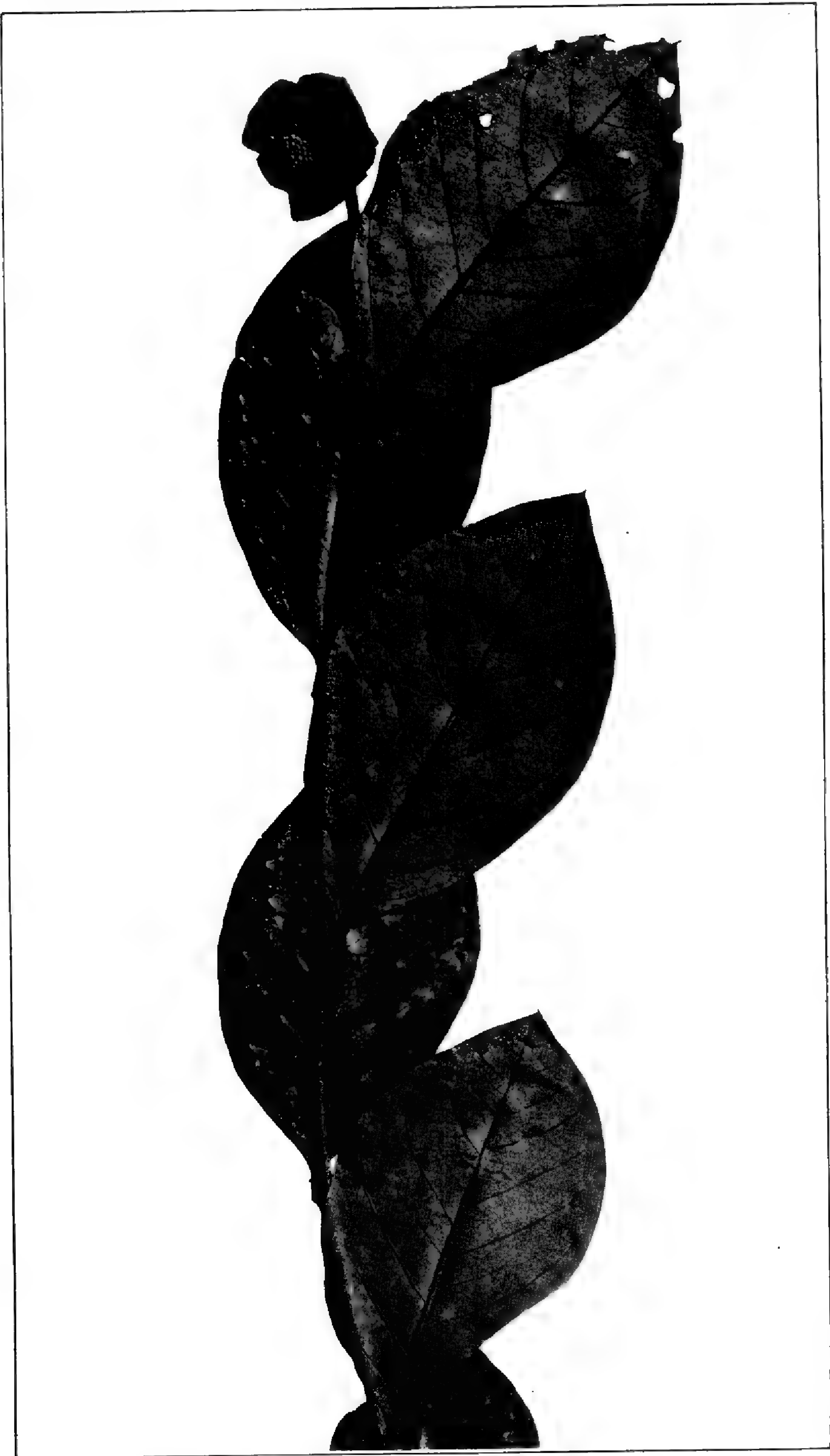
A. *ANNONA CORNIFOLIA* ST. HIL.



B. *ANNONA PALUDOSA* AUBL.



ANNONA JAHNII SAFFORD.



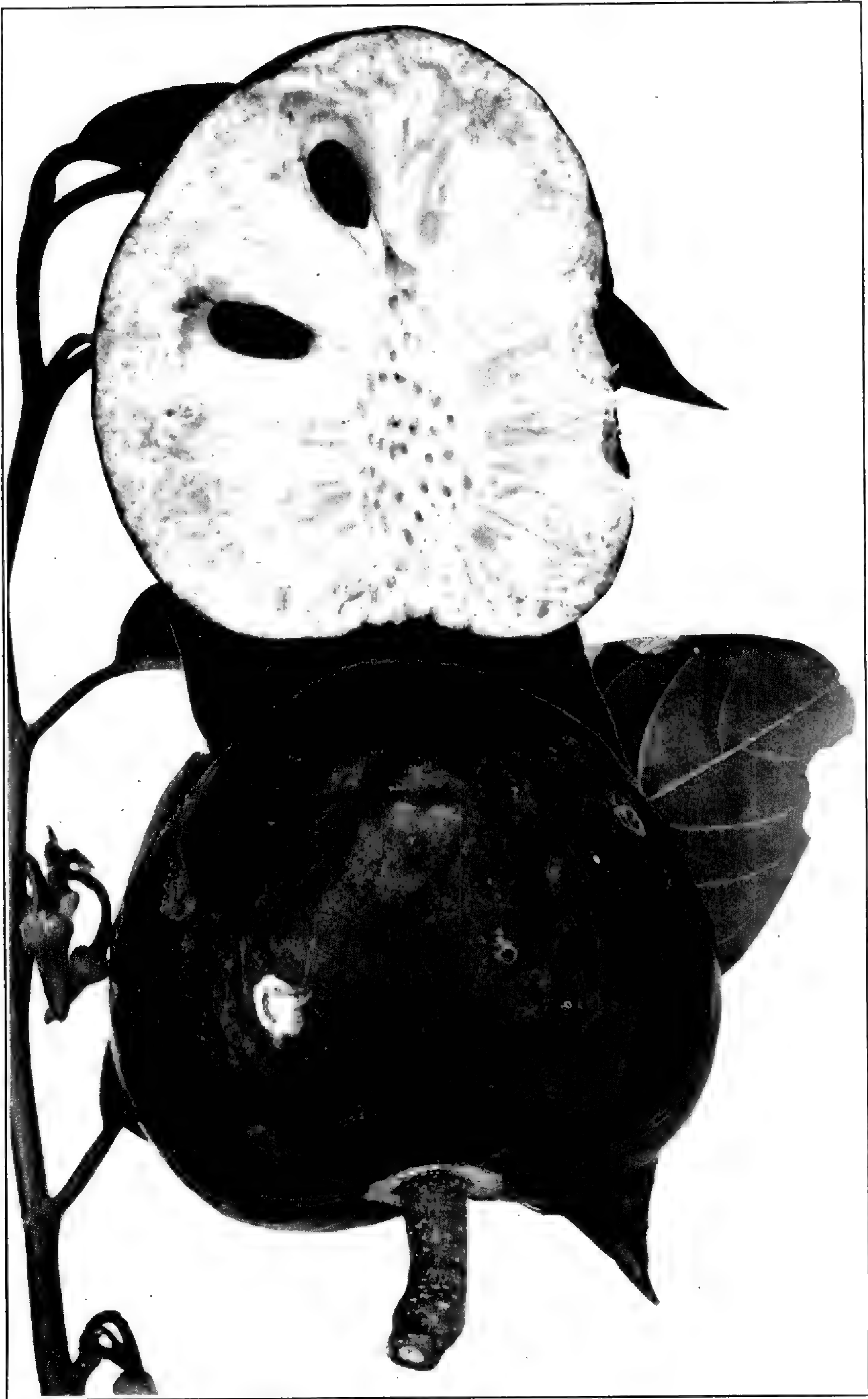
ANNONA CORNIFOLIA ST. HIL., WITH SOLITARY FLOWER.



ANNONA NUTANS R. E. FRIES.



ANNONA ACUTIFLORA MART.



ANNONA LUTESCENS SAFFORD.



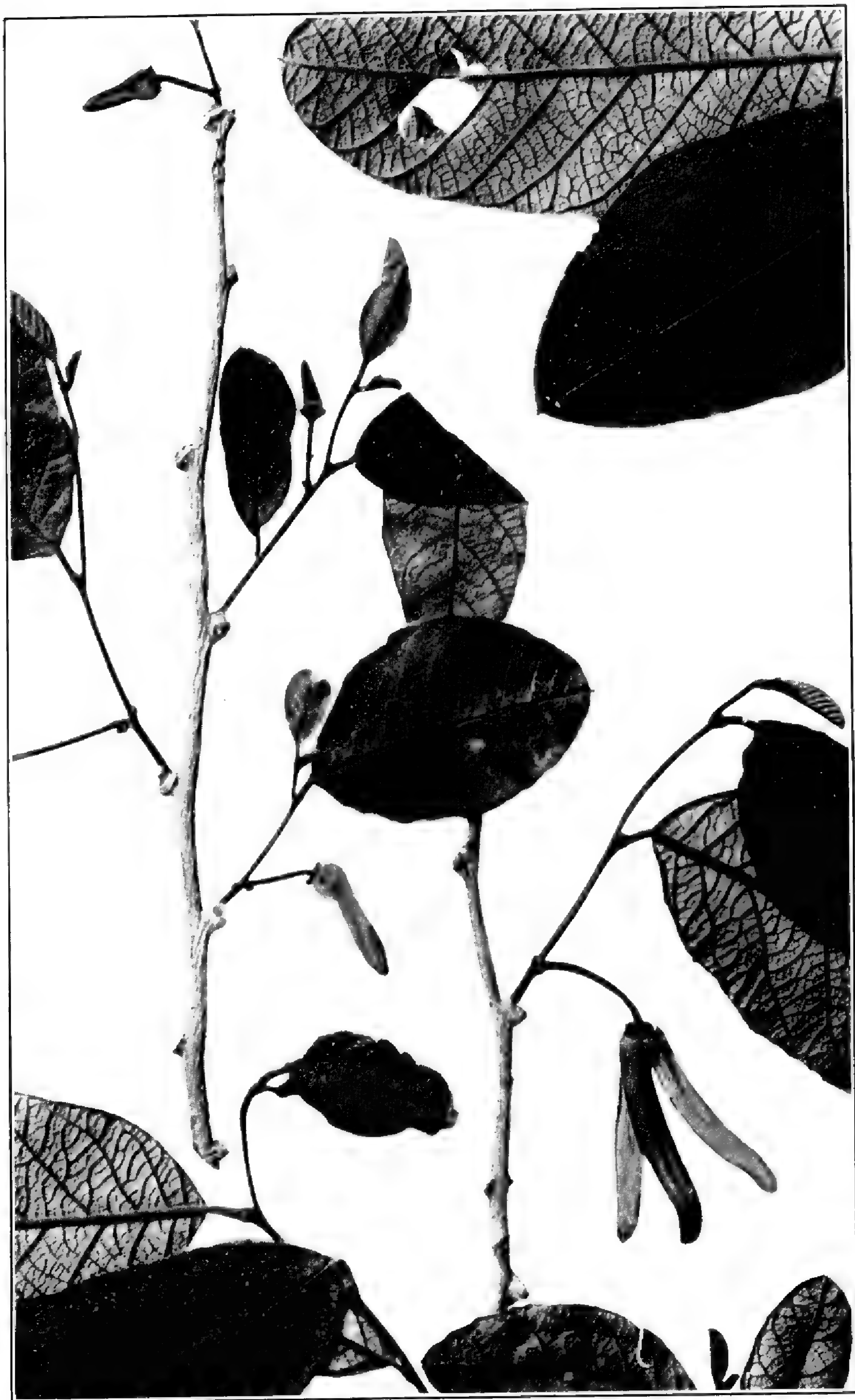
ANNONA PALMERI SAFFORD.



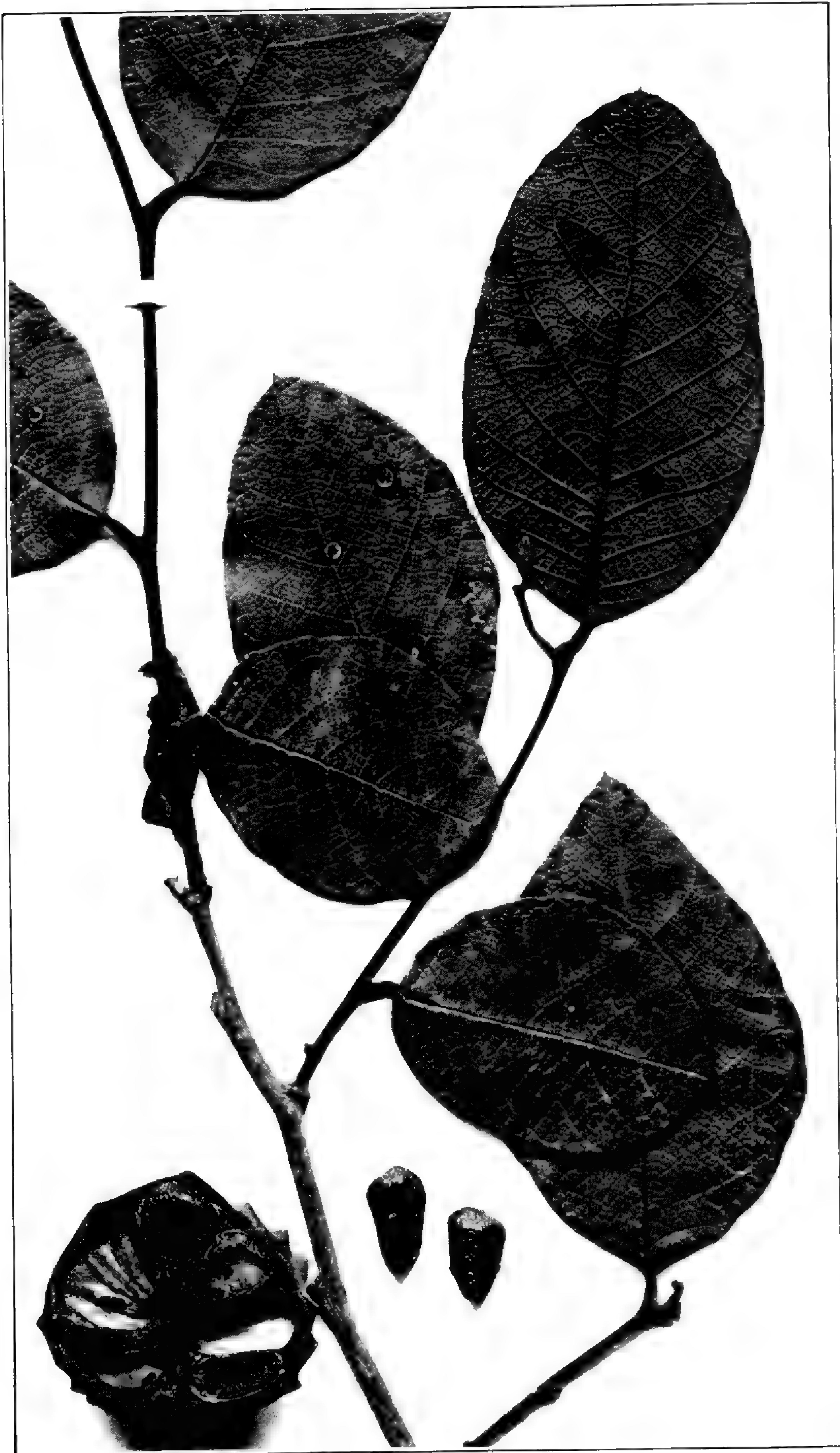
ANNONA LONGIFLORA S. WATS.



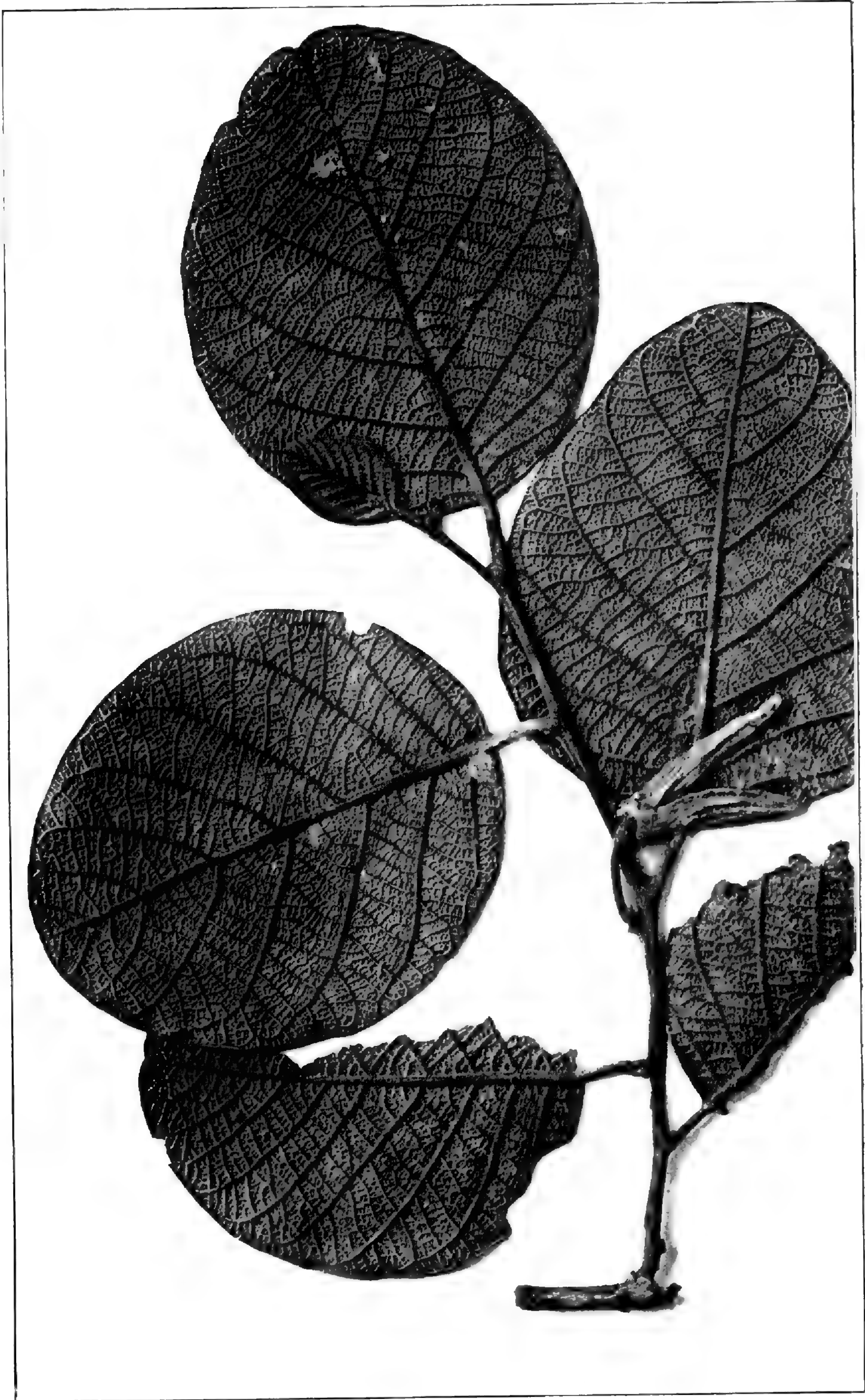
ANNONA MACROPHYLLATA DONN. SMITH.



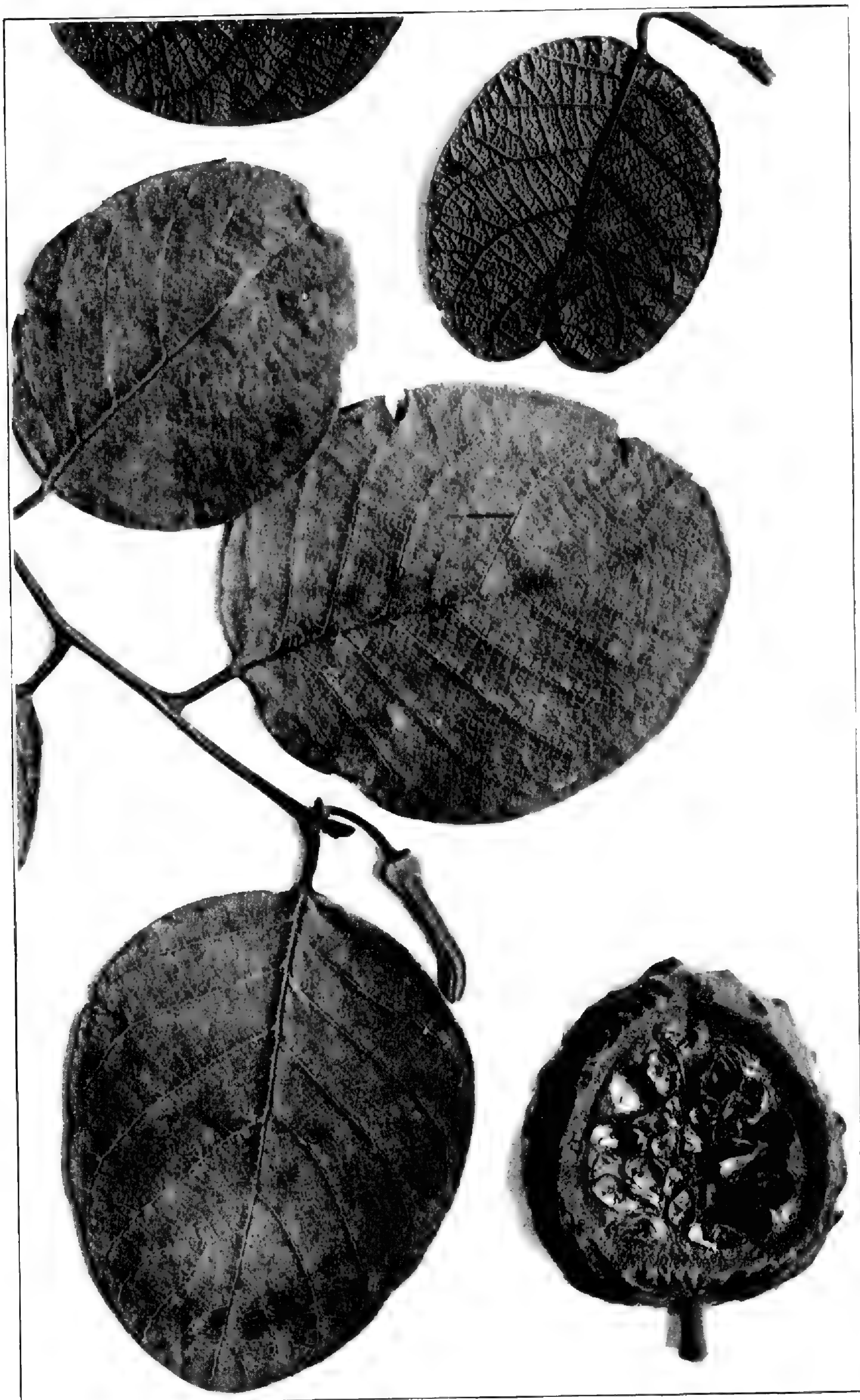
ANNONA BULLATA A. RICH.



ANNONA BULLATA A. RICH., WITH FRUIT.



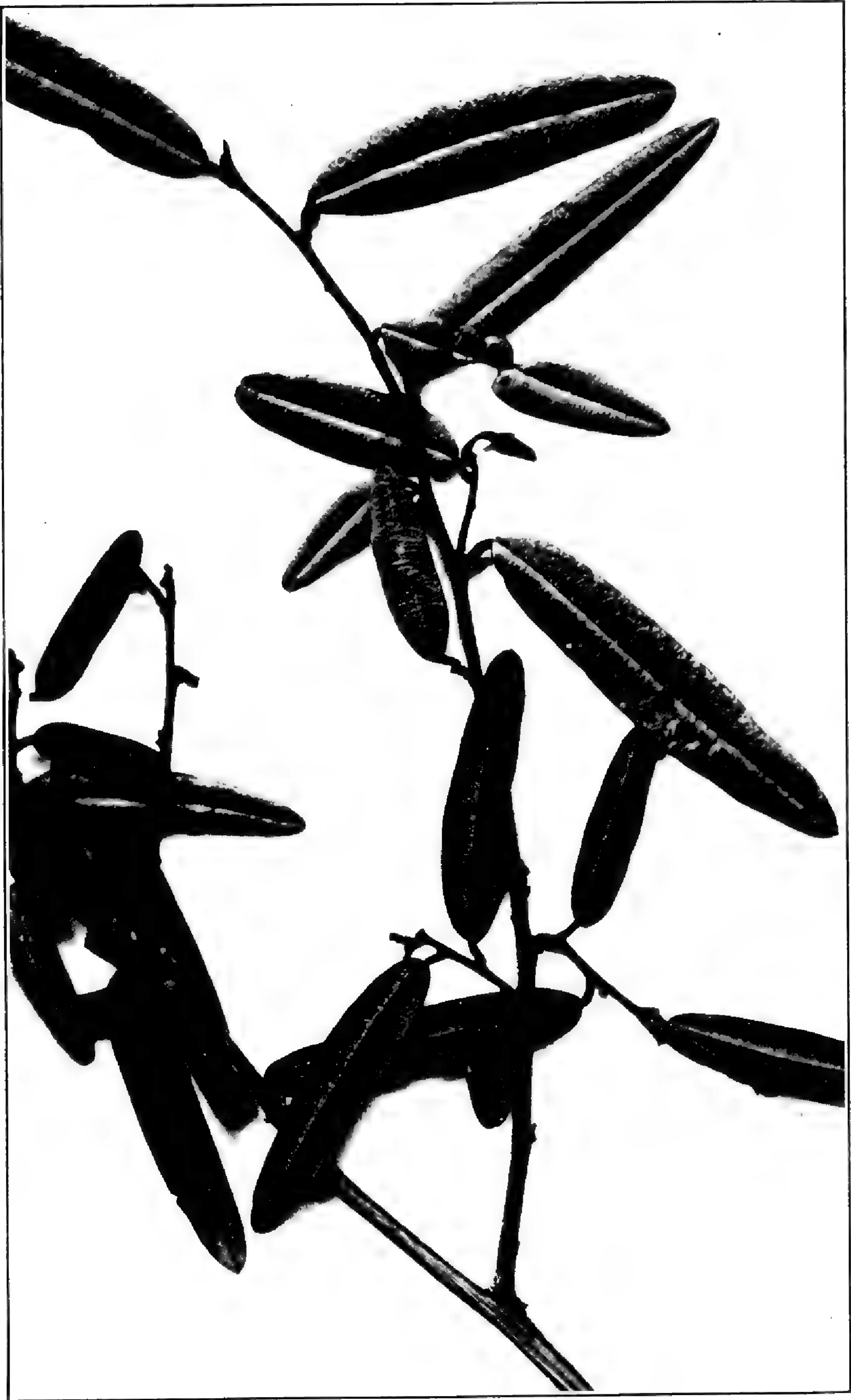
ANNONA CRASSIVENIA SAFFORD.



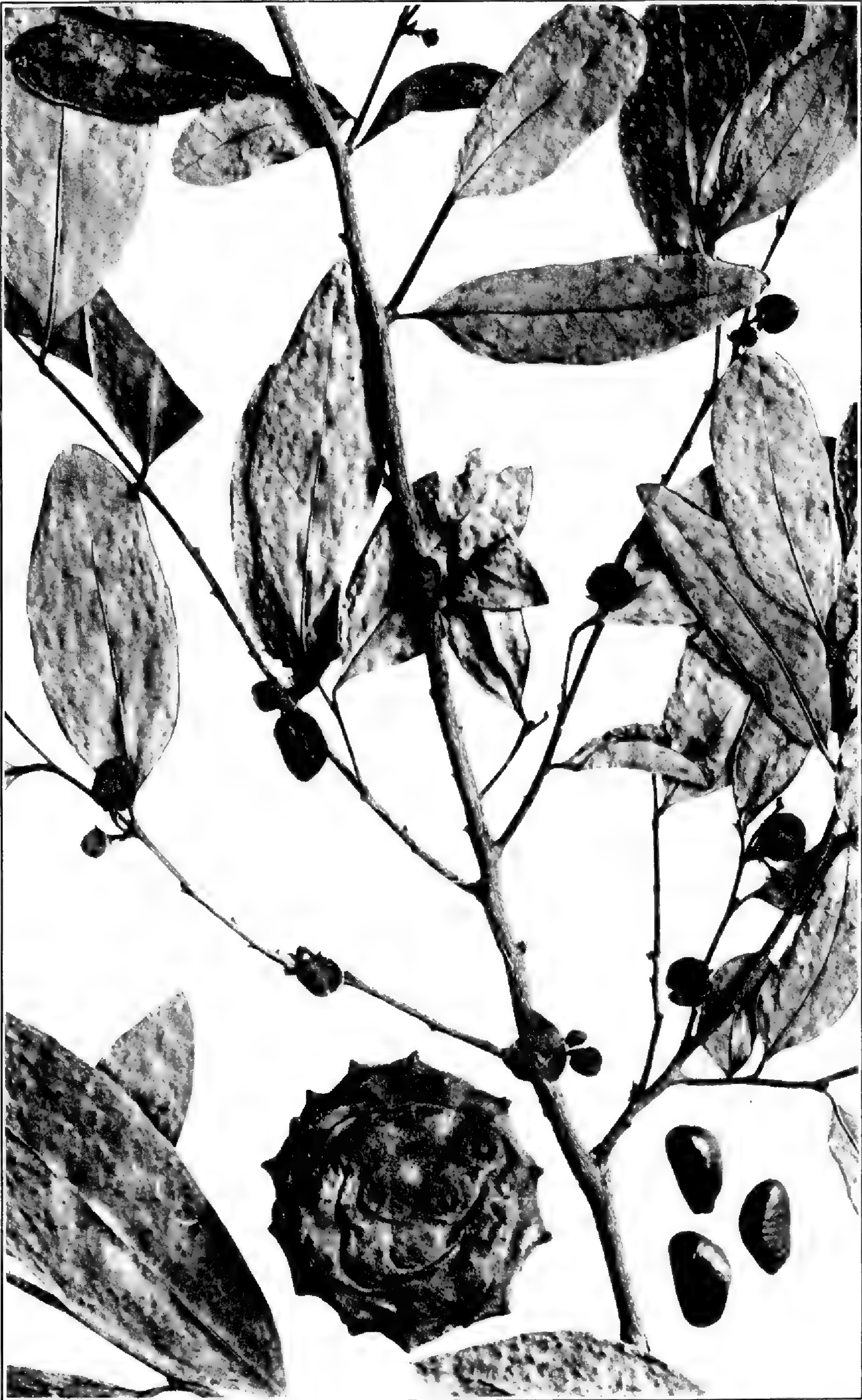
ANNONA CRASSIVENIA SAFFORD, WITH FRUIT.



ANNONA CASCARILLOIDES WRIGHT.



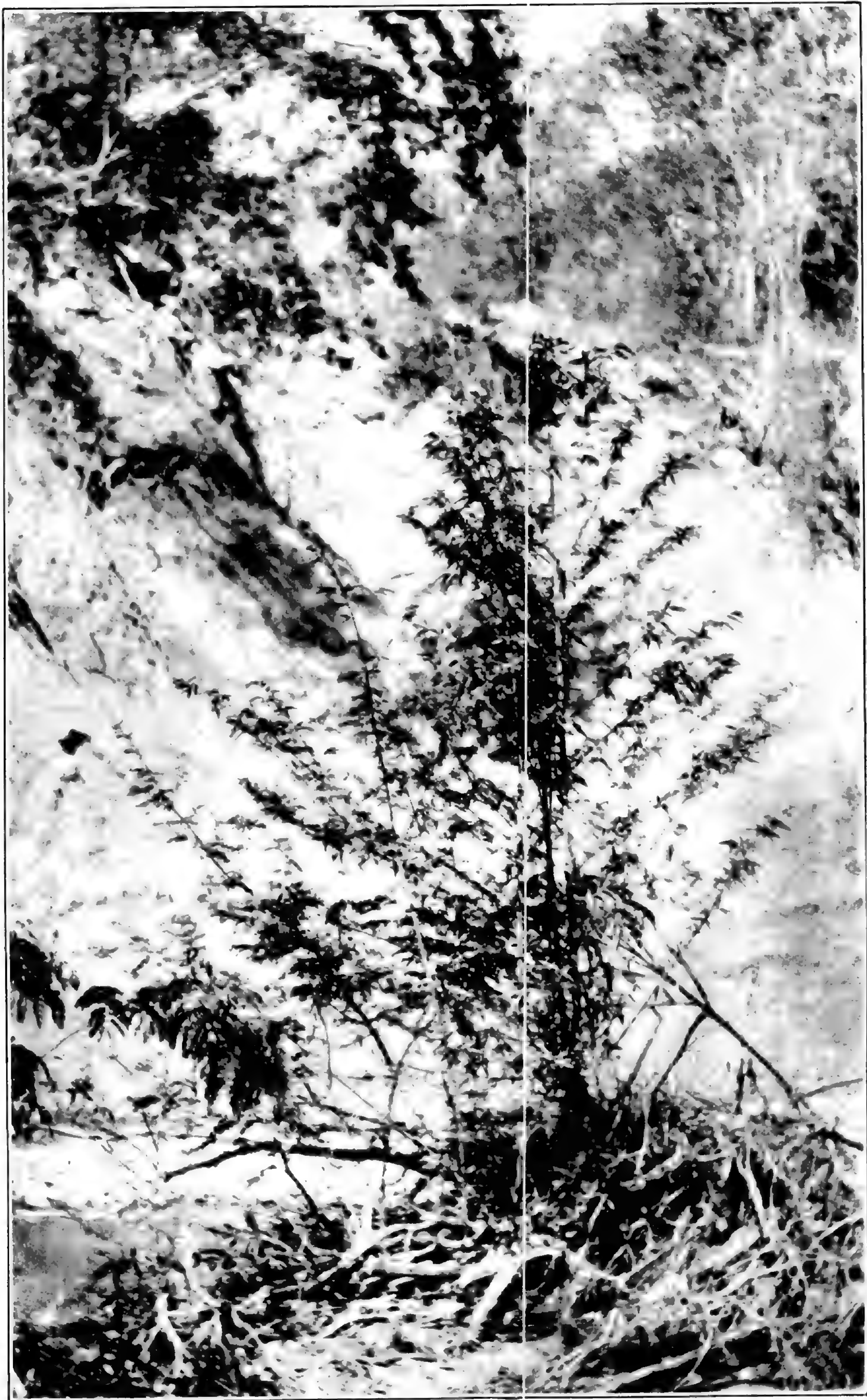
ANNONA SCLEROPHYLLA SAFFORD.



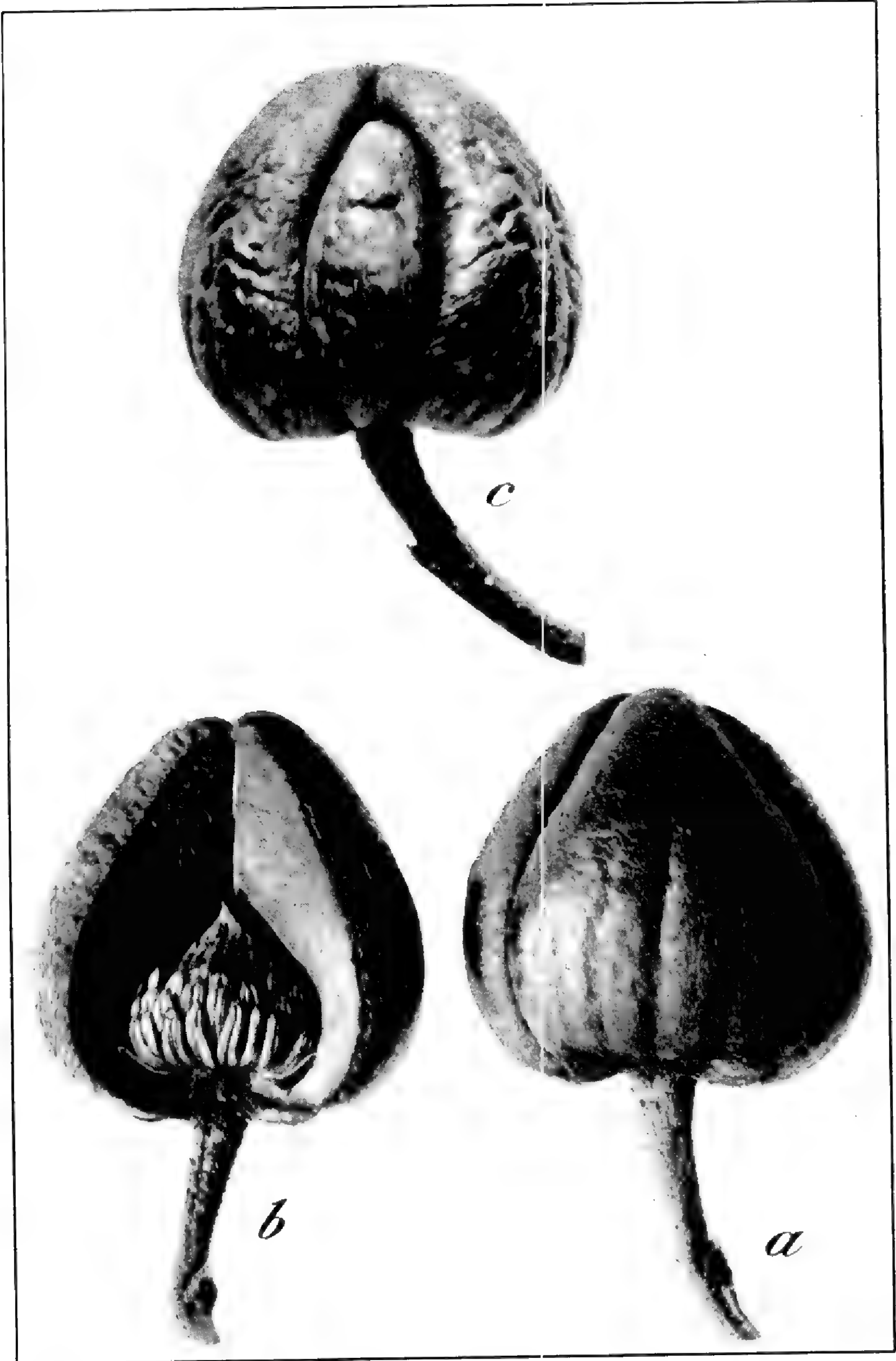
ANNONA GLOBIFLORA SCHLECHT.



ANNONA BICOLOR URBAN.



ANNONA ROSEI SAFFORD.



FLOWERS OF ANNONA ROSEI SAFFORD, ENLARGED.



ANNONA ROSEI SAFFORD.



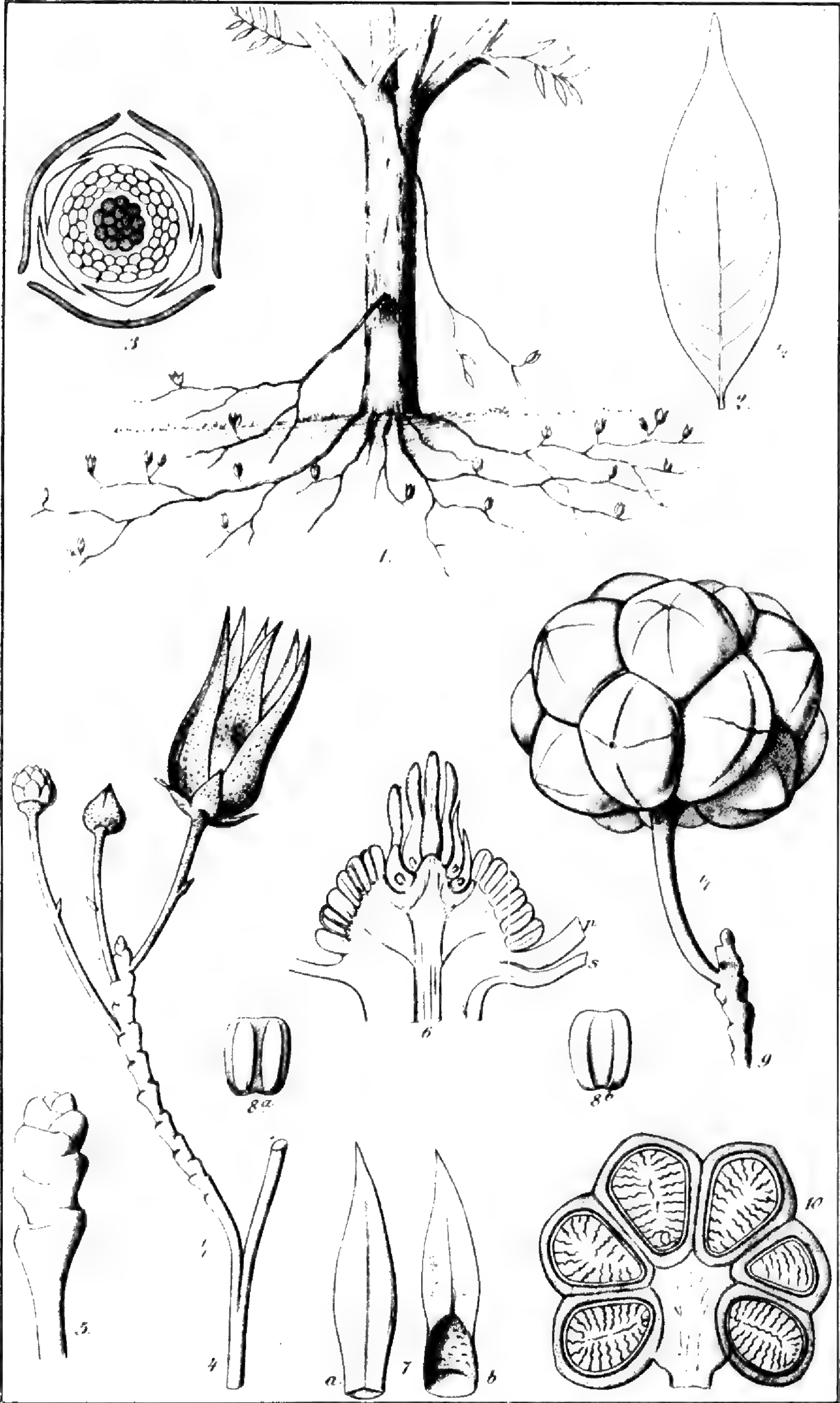
ROLLINIA LONGIFOLIA ST. HIL.



ROLLINIA MUCOSA (JACQ.) BAILL.



RAIMONDIA QUINDUENSIS (H. B. K.) SAFFORD.



GEANTHEMUM RHIZANTHUM (EICHL.) SAFFORD.

INDEX.

[Page numbers of principal entries in boldface type. Synonyms in italics.]

	Page.		Page.
<i>Aberemoa</i>	60, 61, 64, 65	<i>Annona paludosa</i>	9, 11, 12, 34
<i>guianensis</i>	61	<i>palustris</i>	5, 14, 23, 30
<i>glabrescens</i>	61	<i>pittleri</i>	18
<i>longifolia</i>	65	<i>praetermissa</i>	19, 67 , 68
<i>rhizantha</i>	66	<i>purpurea</i>	3, 4, 9, 10, 11, 30 , 31, 32, 33, 36, 37
<i>Acacias</i>	57	<i>pygmaea</i>	8
<i>Acutiflorae</i> (group).....	14	<i>quinduensis</i>	5
(section).....	14, 16	<i>reticulata</i>	4, 19, 42, 43, 58, 68
<i>Agaves</i>	57	<i>rhizantha</i>	5
<i>Alagadisso</i>	39	<i>rhombipetala</i>	64
<i>Alligator apple</i>	15, 43	<i>rodriguesii</i>	10
<i>Annona</i>	7, 13, 21, 36, 46, 47, 58, 59, 60, 61, 65, 66	<i>rosl.</i>	2, 22, 55, 56 , 57
<i>acuminata</i>	2	<i>salzmanii</i>	8, 29
<i>acutiflora</i>	15, 40 , 52	<i>sancta-crucis</i>	12
<i>bicolor</i>	22, 55, 56	<i>scandens</i>	12
<i>bullata</i>	48 , 50, 51	<i>scleroderma</i>	4, 18
<i>cascarilloides</i>	4, 21, 51 , 52, 53	<i>sclerophylla</i>	21, 52
<i>cercocarpa</i>	4	<i>senegalensis</i>	4, 5, 8, 14
<i>cherimola</i>	19, 40, 41, 42, 45, 46, 47, 49, 50, 68	<i>sericea</i>	12, 67, 68, 68
<i>conica</i>	62, 63	<i>sessiliflora</i>	6
<i>coriacea</i>	8, 29	<i>sphaerocarpa</i>	8, 24 , 25
<i>cornifolia</i>	2, 4, 5, 13, 37 , 39	<i>spinescens</i>	13, 39
<i>crassiflora</i>	9, 10	<i>spinescens nutans</i>	39
<i>crassivenia</i>	20, 49, 50 , 51	<i>squamosa</i>	2, 4, 42, 43, 45
<i>crotonifolia</i>	12	<i>stenophylla</i>	4, 8
<i>distribution</i>	4	<i>subdivisions</i>	1
<i>diversifolia</i>	4, 19, 31, 47, 48	<i>tenuiflora</i>	63
<i>dwarf wild</i>	19	<i>testudinea</i>	18
<i>echinata</i>	37	<i>tomentosa</i>	12
<i>flagifolia</i>	13	<i>tripetala</i>	68
<i>fruticosa</i>	54, 55	<i>walkerii</i>	13
<i>glabra</i>	3, 4, 5, 8, 14, 15, 24, 30, 42, 43	<i>Annonas</i>	20
<i>glauca</i>	4, 5	<i>dwarf</i>	21
<i>globiflora</i>	21, 45, 52, 54 , 55, 56	<i>sharp-petaled</i>	14
<i>holosericea</i>	3, 12	<i>silky</i>	9
<i>hypoglauca</i>	12	<i>Annonaceae</i>	28, 54, 55, 56, 57, 59
<i>involucrata</i>	9, 32	<i>Annonella</i> of Santo Domingo.....	2
<i>jahnii</i>	36	<i>Annonella</i> (section).....	21, 52, 55, 56
<i>jamaicensis</i>	67, 67, 68, 68	<i>Annonellae</i> (group).....	21
<i>jenmanii</i>	3, 11, 34	<i>Annonula</i> (section).....	21, 51
<i>klainii</i>	4, 5, 15	<i>Anon cimarron</i>	63
<i>laurentii</i>	5	<i>Anona</i>	15, 48
<i>longiflora</i>	4, 19, 43, 45 , 46, 68	<i>acutiflora</i>	40
<i>longifolia</i>	5, 64	<i>axilliflora</i>	55, 56, 55
<i>longipes</i>	12	<i>bullata</i>	48, 50
<i>lutescens</i>	19, 41 , 43	<i>cascarilloides</i>	51
<i>macrocarpa</i>	10	<i>cornifolia</i>	37, 39
<i>macrophyllata</i>	20, 47 , 48	<i>furfuracea</i>	60
<i>malmeana</i>	12	<i>glabra</i>	15
<i>manirote</i>	32, 33	<i>involucrata</i>	32
<i>mannii</i>	5	<i>jamaicensis</i>	67
<i>marcgravii</i>	8, 25, 27	<i>manirote</i>	30
<i>montana</i>	3, 7, 22 , 25, 27	<i>marcgravii</i>	25, 26, 27
<i>muricata</i>	1, 3, 4, 7, 8, 14, 22, 23, 24, 25, 25 , 26, 30, 31	<i>montana</i>	22
<i>muricata</i>	25	<i>mucosa</i>	58, 59, 60
<i>nutans</i>	2, 3, 4, 5, 13, 35	<i>muricata</i>	32
<i>palmeri</i>	19, 43, 45	<i>obtusiflora</i>	58, 59

	Page.		Page.
<i>Anona pisonis</i>	26	<i>Geanthemum</i>	64, 66
<i>prestoef</i>	32	<i>cadavericum</i>	67
<i>purpurea</i>	30	<i>Geanthemum rhizanthum</i>	66, 67
<i>quinduensis</i>	62	(section).....	64, 66
<i>rhizantha</i>	64, 66	<i>Guanábana</i>	26
<i>Anona amarilla</i>	19, 43	<i>Guanabani</i> (group).....	6, 7, 9, 11
<i>Anonastrum</i> (section).....	4	<i>Guanabani</i> (section).....	8
<i>Anoncillo de Paredon</i>	52	<i>Guanábano cimarron</i>	24
<i>Anoncillo de Sabana</i>	52	<i>Guanabanus</i>	26
<i>Anonidium</i>	5	<i>Guatteria</i>	6, 61
<i>Anonilla</i>	45, 54	<i>sessiliflora</i>	6
<i>Anonita de papagayos</i>	55	<i>Guimamé</i>	35
<i>Araticú apé</i>	8, 26	<i>Hard-shelled custard apple</i>	18
<i>do campo</i>	29, 39	<i>Helenium</i>	27
<i>dos lisos</i>	29	<i>Helogenia</i> (section).....	11, 34
<i>ml</i>	40	<i>Ilama</i>	19, 31, 48
<i>mirim</i>	39	<i>de Tehuantepec</i>	31
<i>flu</i>	40	(section).....	19
<i>of the plains</i>	29	<i>Juglans regia</i>	67
<i>ponhé</i>	8, 26, 27	<i>Laurel</i>	50
<i>Atractanthus</i> (section).....	15, 16	<i>de cuabal</i>	21
<i>Atta</i> (section).....	18, 41, 43, 45, 51	<i>Manirito</i>	37
<i>Attæ</i> (group).....	16	<i>Manirote</i>	10, 31, 32, 37
(section).....	16	<i>Mountain soursop</i>	24
<i>Bosch-zuurzak</i>	8, 25	<i>Negro head</i>	10, 31
<i>Bullock's heart</i>	4, 19, 43	<i>Oblongifloræ</i> (subsection).....	16
<i>Caa-apoam</i>	41	<i>Old woman's head</i>	31
<i>Cabeza de ilama</i>	31	<i>Opuntias</i>	57
<i>de negro</i>	9, 10, 31	<i>Phelloxylon</i> (section).....	8, 9, 14, 16
<i>Cachiman montagne</i>	59	<i>Pilæfloræ</i> (group).....	9, 10
<i>morveux</i>	59	<i>Pilannona</i> (section).....	12, 13, 36
<i>Cactaceæ</i>	57	<i>Pine nuts</i>	46
<i>Chelonocarpus</i> (section).....	9, 16, 18	<i>Pinaloua</i>	66
<i>Cherimola</i>	4, 16	<i>Pinus cembra</i>	46
<i>Chermoliae</i> (subsection).....	16	<i>Pomme-cannelle</i>	18
<i>Cherimoya</i> . See <i>Chirimoya</i> .		<i>Prickly apple</i>	24
<i>Chick-peas</i>	55	<i>Psammogenia</i> (section).....	8, 30
<i>Chincua</i>	31	<i>Raimondia</i>	5, 18, 58, 61, 63, 64
<i>Chirimoya</i>	19, 20, 40, 49, 59, 68	<i>monolca</i>	61, 62, 63
<i>cimarrona</i>	55	<i>quinduensis</i>	62, 63
<i>de la barranca</i>	46	<i>Rastinga</i>	41
<i>long-flowered</i>	19	<i>Restinga</i>	41
<i>wild, of Jamaica</i>	68	<i>Rollinia</i>	13, 58, 61
<i>Corkwood</i>	14	<i>emarginata</i>	55
<i>Corossol batard</i>	23	<i>longifolia</i>	58
<i>sauvage</i>	35	<i>mucosa</i>	5, 58, 59, 60
<i>Corossolier bâlard</i>	24	<i>orthopetala</i>	60
<i>maron</i>	24	<i>pulcherrimvia</i>	60
<i>Crataegus mexicana</i>	47	<i>sieberi</i>	58, 60
<i>Custard apple</i>	18, 47	<i>silvatica</i>	5
<i>common</i>	18, 19	<i>Salzmannia</i>	29
<i>hard-shelled</i>	18	<i>Saxigena</i> (section).....	20, 48, 50
<i>little, of the parrots</i>	55	<i>Sencuya</i>	31
<i>Custard apples</i>	16	<i>Sharp-petaled Annona</i>	14
<i>Duguetia</i>	58, 60, 61, 64, 65, 66	<i>Silky Annonas</i>	9
<i>bracteosa</i>	67	<i>Soncolla</i>	31
<i>furfuracea</i>	61	<i>Soncoya</i>	31
<i>lanceolata</i>	60	<i>Soursop</i>	26, 28
<i>longifolia</i>	64, 65	<i>wild</i>	8, 24, 25, 26, 28
<i>rhizantha</i>	66	<i>Soursops</i>	6, 9
<i>Dwarf Annonas</i>	21	<i>Sugar apple</i>	59
<i>anona</i>	45	<i>Tejocote</i>	47
<i>Euannona</i> (section).....	7, 8, 9, 22, 25, 28, 30	<i>Toreta</i>	31
<i>Fritillaria</i>	27	<i>Ulocarpus</i> (section).....	9, 11
<i>Fusaea</i>	64	<i>U varia sessilis</i>	67
<i>longifolia</i>	65	<i>Water apple</i>	14, 15
(section).....	64, 65	<i>Wild soursop</i>	8, 24, 25, 26, 28
<i>Gamopetalum</i> (section).....	13, 37		
<i>Garbanzos</i>	55		

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UNITED STATES NATIONAL HERBARIUM

VOLUME 18, PART 2

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By HENRY PITTIER



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BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

ISSUED APRIL 16, 1914.

II

PREFACE.

The present paper, by Mr. Henry Pittier, of the Bureau of Plant Industry, United States Department of Agriculture, is in continuation of a series begun by him several years ago in the Contributions, dealing principally with Colombian and Central American plants which are of economic value. Besides descriptions of two new species of Brosimum and Spondias there are here included further notes upon the difficult genus Sapium and a discussion of the nomenclature of the sapote and sapodilla, two important tropical American fruit trees whose taxonomic history is exceedingly involved.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

CONTENTS.

	Page.
Introduction.....	69
Moraceae.....	69
A new species of Brosimum from Costa Rica.....	69
Euphorbiaceae.....	70
Further notes on species of Sapium.....	70
Anacardiaceae.....	75
A new species of Spondias from Costa Rica.....	75
Sapotaceae.....	76
Zapotes and Zapotillos.....	76
Index.....	IX

ILLUSTRATIONS.

PLATES.

	Facing page.
PLATE 42. <i>Sapium verum</i> Hemsl.....	70
43. <i>Sapium verum</i> Hemsl.....	71
44. A. Seeds of <i>Sapium hippomane</i> Meyer. B. Seeds of <i>Sapium verum</i> Hemsl. C. Seeds of <i>Sapium tolimense</i> Jumelle.....	72
45. <i>Sapium hippomane</i> Meyer.....	73
46. <i>Achras zapota</i> L.....	78
47. Seeds of <i>Achras zapota</i> L.....	79
48. <i>Calocarpum mammosum</i> Pierre.....	81
49. A. Seeds of <i>Calocarpum mammosum</i> (L.) Pierre. B. <i>Calocarpum</i> <i>mammosum</i> (L.) Pierre.....	81
50. Fruit of <i>Calocarpum mammosum</i> (L.) Pierre.....	82
51. Fruit of <i>Calocarpum mammosum</i> (L.) Pierre.....	82
52. <i>Calocarpum viride</i> Pittier.....	84
53. Fruit and seeds of <i>Calocarpum viride</i> Pittier.....	84
54. A. Seeds of <i>Calocarpum viride</i> Pittier. B. <i>Calocarpum viride</i> Pittier.....	85
55. Fruits of <i>Lucuma salicifolia</i> H. B. K.....	86
56. Seeds of <i>Lucuma salicifolia</i> H. B. K.....	86

TEXT FIGURES.

	Page.
FIGURE 76. Flowers of <i>Brosimum terrabanum</i>	69
77. Male flower of <i>Sapium tolimense</i>	72
78. Female flower of <i>Sapium tolimense</i>	72
79. Tip of leaf of <i>Sapium hippomane</i>	73
80. Male flower of <i>Sapium hippomane</i>	73
81. Female flower of <i>Sapium hippomane</i>	74
82. Floral details of <i>Spondias nigrescens</i>	76
83. Floral details of <i>Calocarpum mammosum</i>	82
84. Spread corolla of <i>Calocarpum mammosum</i> with stamens and staminodes	82
85. Part of corolla of <i>Calocarpum viride</i> with stamens and staminodes..	84
86. Floral details of <i>Calocarpum viride</i>	85
87. Floral details of <i>Lucuma salicifolia</i>	86

NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA—4.

By HENRY PITTIER.

INTRODUCTION.

The present paper, relating mainly to economically important trees of the families Euphorbiaceae and Sapotaceae, is in continuation of several others which have appeared in the Contributions from the United States National Herbarium¹ and is similar in scope.

MORACEAE.

A NEW SPECIES OF *BROSIMUM* FROM COSTA RICA.

Brosimum terrabanum Pittier, sp. nov.

FIGURE 76.

A large, lactiferous forest tree. Bark smooth, grayish. Crown elongate.

Leaves rather large, chartaceous, glabrous, petiolate. Petioles rather thick, shallow-canaliculate, 8 to 12 mm. long. Leaf blades elliptic, slightly rounded at the base, long and acutely acuminate, 10 to 18 cm. long, 4 to 7 cm. broad. Costa prominent beneath; primary nerves parallel, forming with the costa a very open angle (about 80°). Margin entire.

Stipules narrowly lanceolate, acute, about 1 cm. long, smooth, caducous.

Receptacles axillary, globose, about 9 mm. in diameter, pedunculate. Peduncles 10 to 14 mm. long, slender, smooth. Bracts of the receptacle surface orbiculate, peltate, pedicellate, hairy-ciliate, not over 0.6 mm. in diameter; pedicels hairy, 0.8 to 1 mm. long. Bractlets at the base of the stamens broad and very short (about 0.7 mm.), hairy and ciliate.

Stamen 1 to 2.5 mm. long; filament sparsely pubescent; anther 1-celled, peltate. Style about 5 mm. long, bifurcate at the middle, dark purple, densely hairy-pubescent.

Fruit not known.

Type in the U. S. National Herbarium, no. 577522, collected in forests of Peñas Blancas del General, Diquís Valley, Costa Rica, at about 600 meters above sea level, February 9, 1898, flowers, by H. Pittier (Inst. Fís. Geogr. Costa Rica, no. 12029).

The type specimen includes a few detached receptacles, gathered on the ground, and two or three branchlets which may have been culled from the base of the trunk. A few notes taken at the same time give some supplemental information. These materials are certainly not a very satisfactory foundation for a new species, but the leaves differ greatly from those of *Brosimum costaricanum* Liebm. in having longer petioles, a large blade, and primary nerves almost perpendicular to the costa, and in being thin and



FIG. 76.—Flowers of *Brosimum terrabanum*. a, Male flower; b, female flower. a, Scale 6; b, scale 3.

¹ 12: 171–181. pls. 18, 19. figs. 11–19. January 27, 1909; 13: 93–132. pls. 17–20. figs. 2–41. June 11, 1910; 13: 431–466. pls. 78–96. figs. 57–91. January 5, 1912.

not coriaceous. The receptacles also are larger, with much longer peduncles, and they all seem to be distinctly monoclinal, with well developed and fertile ovaries. On the other hand, they bear a somewhat close resemblance to John Donnell Smith's no. 2603, collected in Guatemala and distributed as *B. alicastrum* Swartz.

EUPHORBIACEAE.

FURTHER NOTES ON SPECIES OF *SAPIUM*.

Sapium verum Hemsl. in Hook. Icon. Pl. 27: pl. 2647. 1900; Engl. Pflanzenreich IV. 1474: 211. 1912, char. emend. PLATES 42, 43, 44, B.

A tree 20 to 30 meters high, with ascending, slightly divaricate limbs, and a rounded crown. Floriferous branchlets thick.

Leaves bunched at the ends of the branchlets and rather large; petiole 2.5 to 4 cm. long (1 to 5 cm., Hemsley), thick, hardly sulcate, provided above with two short, rounded glands. Leaf blades oblong or ovate-elliptic, 8 to 16 cm. long (12 to 20 cm., Hemsley), 3 to 5 cm. broad, more or less rounded or cuneate at base, obtuse at tip and provided with a slightly inflexed, cucullate-glandulose acumen; margin glandulose-denticulate; costa impressed above, prominent beneath; primary veins over 20, slender, sinuate, and anastomosed. Stipules suboval, 3 to 4 mm. long and broad, with a broadly scarious, more or less fimbriate margin.

Floral spikes 14 to 15 cm. long, inserted in the axils of the upper leaves. Male flowers short-pedicellate, up to 15 under each bractlet, mixed with small glanduliferous scales; glands ovate, about 4 mm. long; bracts broadly triangular and subflabelliform, about 2.5 mm. long and 5 mm. broad, thick at the base, with a scarious, irregularly sinuate-denticulate margin. Perianth campanulate, attenuate at the base, about 4 mm. long, with rounded-sinuate lobules. Stamens half exserted, the filaments thick, bulging at the middle, the anthers yellow. Female flowers not known.

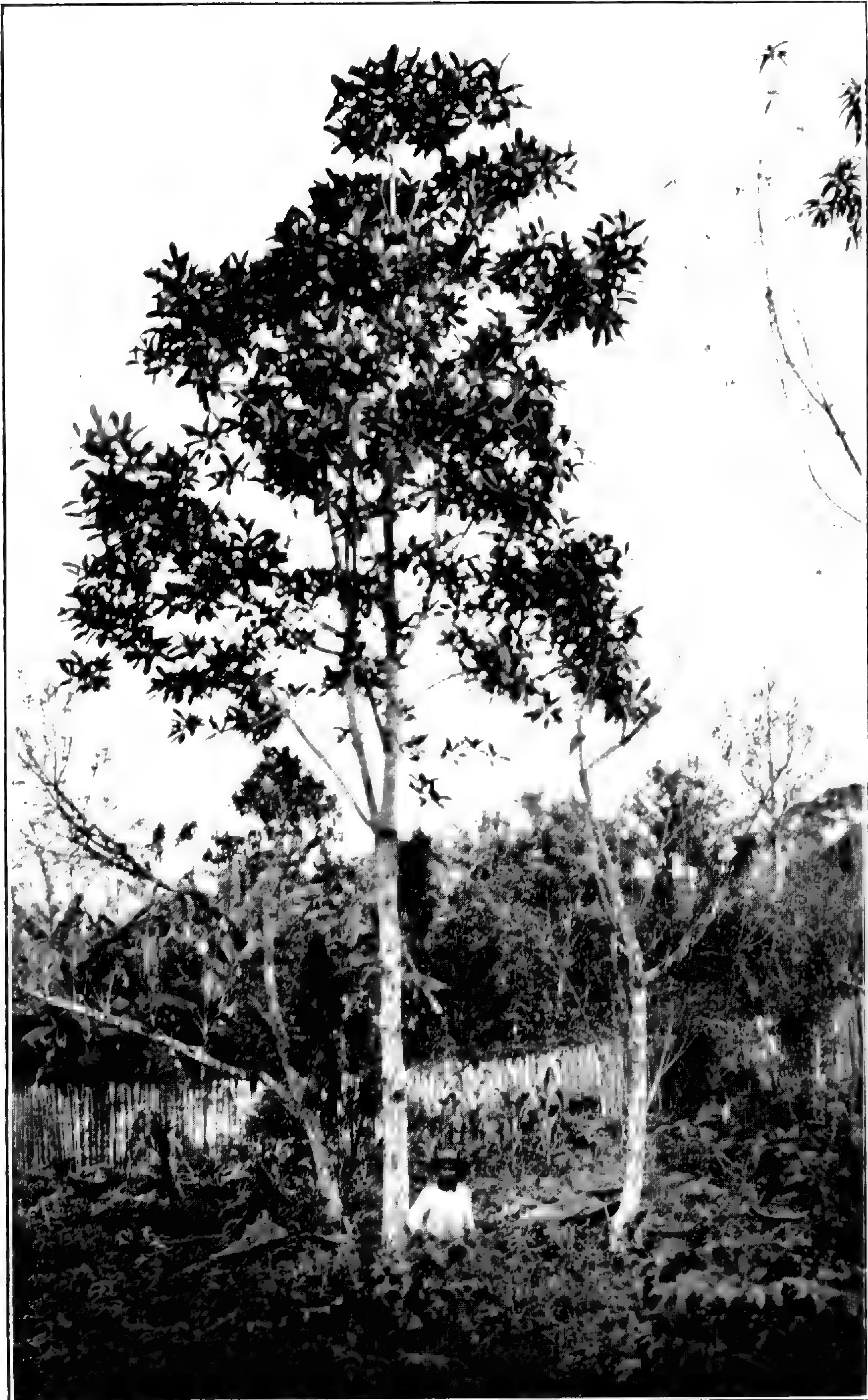
Capsule subglobose, pedicellate, about 12 mm. long and 15 mm. in diameter, 3-celled; pedicels slender, about 4 mm. long, crowned by the persistent stylar column. Seeds lenticular, 7 to 8 mm. long, 5 mm. thick, apiculate, verruculose, sinuate-cristate on the margin; "embryo central; cotyledons orbicular" (Hemsley).

COLOMBIA: Departments of Tolima and Cauca, alt. 2,000 to 2,300 meters, R. B. White in 1890 and again in 1895, no. 9 (Hemsley, loc. cit.); Cuesta de Tocotá, Western Cordillera of Colombia (Cauca), alt. 1,500 meters, Pittier 716, male flowers and seeds, December 21, 1905 (U. S. National Herbarium, nos. 530906-7. The foregoing description is mainly based on these Tocotá specimens).

In December, 1905, after several unsuccessful attempts to find in the forests and on the farms of the Cauca Valley this important rubber tree, which is one of the principal sources of the virgin or white rubber of Colombia, the writer was directed to the Cuesta de Tocotá Rubber Plantation, situated in a rather wet district of the seaward slope of the Western Cordillera, on the road leading from Calí to Buenaventura. It was soon found that the plantation really consisted of two fully grown trees, said to be 14 years old, another tree about 4 years old and blooming for the first time, and a few dozen seedlings under 1 year of age. According to the owner, the tree was formerly plentiful in the surrounding woods, but it has been so utterly destroyed by rubber gatherers that not a single sapling could be found.

The larger tree had attained almost portly dimensions, being about 18 meters high and 65 cm. in diameter and branching at about 2.5 meters from the ground. The smaller tree, of which a picture is given here (pl. 43), was 25 cm. in diameter and about 8 meters high. The leaves of the seedlings are twice as large as those of the grown trees and are generally of a deep purple color.

The larger trees bore only young capsules, of which I obtained later some mature specimens, unfortunately all detached from the rachis. On the younger tree there



SAPIUM VERUM HEMSL.



SAPIUM VERUM HEMSL.

were only male flowers. At the time of my visit one of the older trees had just been tapped and had given about 500 grams of an amber yellow, translucent scrap rubber, apparently of excellent quality.

The collected materials were identified later as belonging to *Sapium verum* Hemsl., the small noticed differences in the characters of the leaf being ascribed to their rather immature condition. When, however, our herbarium sheets were submitted to the authorities at the Kew Herbarium, they were very emphatic in their belief that my determination was wrong: "The specimen sent as *Sapium verum* Hemsl. is not that species, and it appears to be distinct from any other in the Kew Herbarium. It has oblong-ob lanceolate leaves, acutely cuneate at the base, with sharply serrulate margins, and the upper surface is not papillous, whereas in *S. verum* the leaves are oblong, obtuse at the base, and the margin is very remotely glandular-denticulate, and the upper surface, when seen through a pocket lens, is minutely papillous." The deviation in the shape of the leaf and the details of the margin is, as mentioned above, merely an exponent of the undeveloped condition of the former organ. The papillæ of the upper surface are a general character of the genus, and their absence on a few leaves can not be in any way conclusive. The shape and size of the capsules and seeds, as well as the angle formed by the primary veins and the costa, are far more important and correspond in our specimens with the description given by Mr. Hemsley. In a further communication from the Kew Gardens it is stated that the seeds "are identical with a first sample received in 1901 from Mr. R. Thomson, but smaller than those received from the same source in 1890, and figured by Mr. Hemsley in Ic. Plant., pl. 2647, fig. 5-8."¹ (See also pl. 44, B, herewith.)

Now, I think we have here a fair illustration of the danger of describing a new species on heterogeneous materials. In the plate referred to, figures 2 to 4 represent exactly the seeds which came from the large tree at Tocotá, the smaller tree from which the herbarium specimens were gathered being a seedling obtained from the former. Figures 5 to 8 of the same plate, however, represent seeds of a distinct species. The seeds received in 1890 accompanied the specimens figured by Hemsley and belonged to them. They were sent by a Mr. R. B. White and were understood to have come from the middle belt, at altitudes of from 2,000 to 2,380 meters, of the mountainous departments of Tolima and Cauca in Colombia. The seeds sent by Mr. R. Thomson in 1901 came from La Mesa, in the State of Cundinamerca, near the upper limit of the lower belt (1,000 meters). They are identical with those accompanying specimens received by me from El Chaparral, about 800 meters above sea level, in the State of Tolima, through the kindness of Mr. Andrés Rochá. These two localities, situated on the opposite watersheds of the Magdalena, are not far distant. The identity of the seeds from La Mesa and El Chaparral is confirmed by the fact that Mr. Thomson sent to Dr. E. M. Holmes, the able curator of the Museum of the Pharmaceutical Society of Great Britain, not only a quantity of these, a few of which were presented to the Kew collections, but also leaves of the tree producing them. Mr. Holmes had the kindness to send me an impression of one of the latter and it agrees in its least details with our specimens from El Chaparral.

My attention was first called to the Tolima *Sapium* by some imperfect and badly prepared herbarium specimens brought from El Chaparral by Mr. C. Wercklé, a botanist residing in San José, Costa Rica. These specimens were sent to Kew with those from Tocotá and were referred to *S. verum* Hemsl., while the latter were pro-

¹ This explanation is in contradiction with those given by Mr. Hemsley in the text accompanying plate 2647. Figures 2 to 4 were drawn from specimens supplied by Mr. White and correspond evidently with his herbarium specimens, while figures 5 to 8 represent seeds sent by Mr. Thomson. The sources, consequently, are not the same, and the localities whence the samples came are far apart geographically and as to climate.

nounced distinct. These Chaparral samples differ, however, from the species described by Mr. Hemsley in several details, which are better seen in the new materials which I succeeded later in obtaining from the same locality.

The materials at hand enable me to show conclusively that the rubber tree of the lower part of Tolima is quite distinct from the *S. verum* growing at high altitudes. Perusing now the literature of the subject, I find that Prof. Henri Jumelle, of the Faculty of Sciences of Marseille, gave in 1903¹ an incomplete description of a *Sapium tolimense* Hort., which corresponds to our specimens as to the leaves, but shows again confusion as to the seeds, attributing to this species the smaller ones of *S. verum*.



FIG. 77.—Male flower of *Sapium tolimense*.
a, Floral bud; b, open flower; c, stamens.
All scale 6.

Nevertheless, Professor Jumelle is categorical in his opinion that *S. tolimense* is distinct from *S. verum*: "Il ne nous est cependant pas possible d'identifier, comme en a tendance Mr. Hemsley, le *Sapium tolimense* avec le *S. verum*." The confusion of the seeds again prevents a clear recognition of the fact that the species grow at different altitudes. It needs to be definitely understood that *S. verum* is an andine species of temperate and even cold climate (upper *tierra templada*

and lower *tierra fria*), while *S. tolimense* belongs to the lower belt (upper *tierra caliente*) and to the lower part only of the middle one (lower *tierra templada*).

In conclusion, the following description, drawn from the specimens sent by Mr. A. Rochá, is believed to show clearly that *Sapium tolimense* is not a synonym of *Sapium verum*, but the name of a legitimate and well-characterized species.

EXPLANATION OF PLATES 42, 43.—From photographs taken by Pittier and Doyle at Cuesta de Tocotá, Cauca, Colombia. Pl. 43, natural size.

Sapium tolimense Jumelle, Pl. Caoutch. ed 2. 151. 1903.

PLATE 44 C. FIGURES 77, 78.

Sapium thomsoni Godefr. Leb.; Jumelle, loc. cit.

A tree 20 to 30 meters high. Floriferous branchlets very thick.

Leaves large, thick, glabrous. Petioles thick, 2 to 5 cm. long, broadly canaliculate, the petiolar glands short, rounded, and contiguous to the blade. Leaf blades 15 to 26 cm. long, 6 to 13 cm. broad, ovate, rounded at base, obtusely rounded-acuminate, or rounded, or even emarginate, but never acute at tip; margin more or less distinctly sinuate-toothed;² costa broad, prominent beneath; primary veins nearly perpendicular to the costa, prominent on both sides but more so underneath, *strongly reticulate-anastomosed* toward the margin. Stipules elliptic-ovate, up to 7 mm. long and 4 mm. broad, with a scarious, sinuate-denticulate margin.

Floral spikes very thick, 20 to 25 cm. long, inserted at the base of the year's new growth.

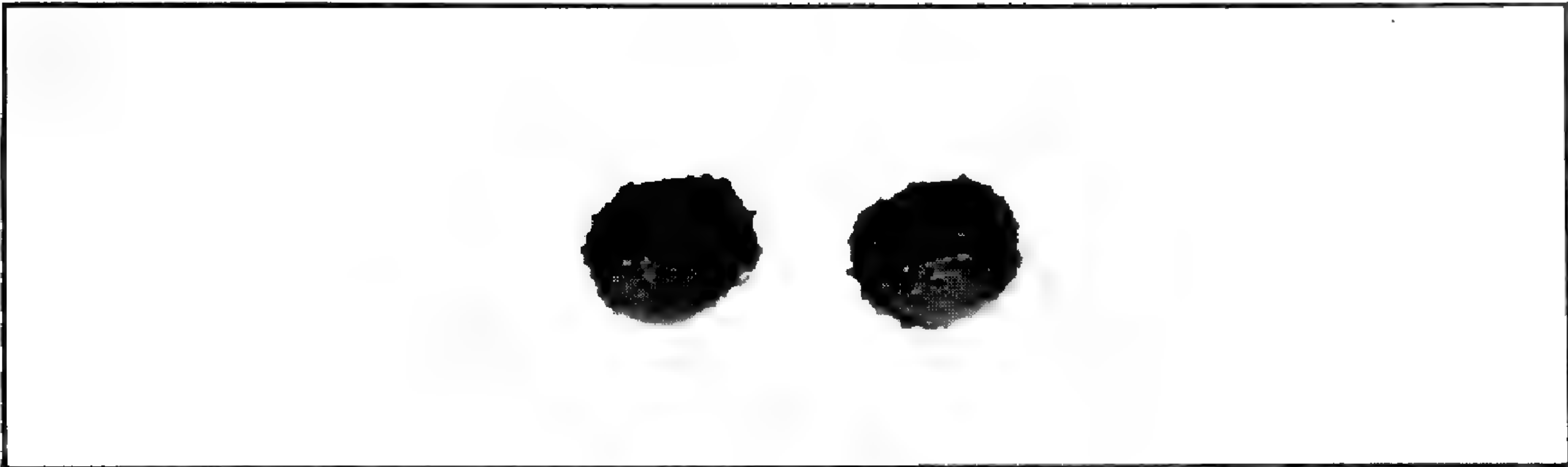
Basal glands small (not over 5 mm. in diameter), orbiculate. Female flowers up to 10, inserted at base of spike; bract 2 mm. long and 4.5 mm. broad, scarious, rounded or broadly triangular, more or less lobulate and denticulate on the margin, accompanied on each side by several clublike, purple glandules about 1



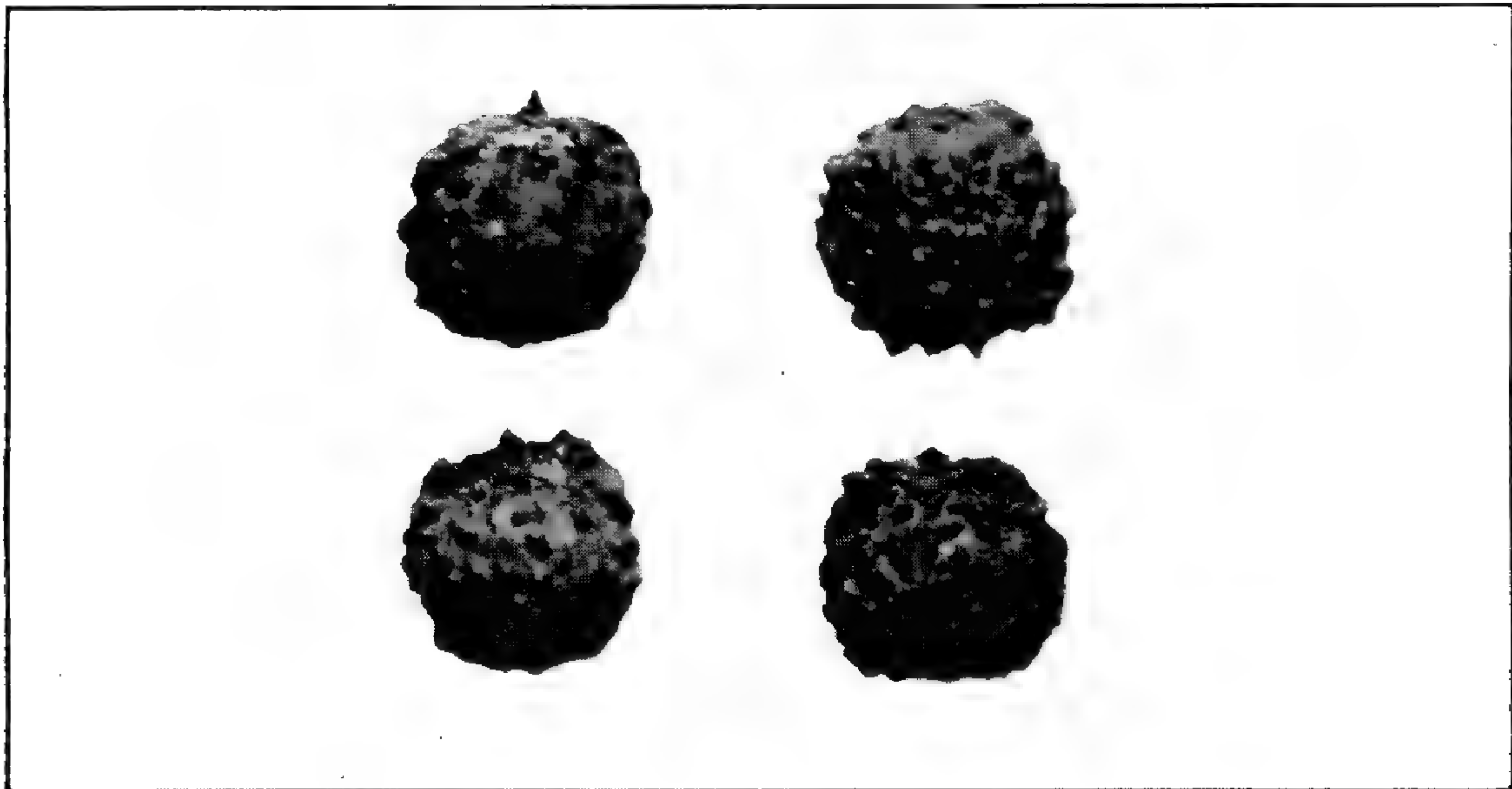
FIG. 78.—Female flower of *Sapium tolimense*. a, Bracts; b, glandules; c, free divisions of perianth. All scale 6.

¹ Jumelle, H. Les plantes à Caoutchouc et à Gutta. ed. 2. 151. 1903. The citation in Engler's Pflanzenreich (IV. 1474: 211) refers wrongly to the first (1898) edition of this work, in which the species is not mentioned.

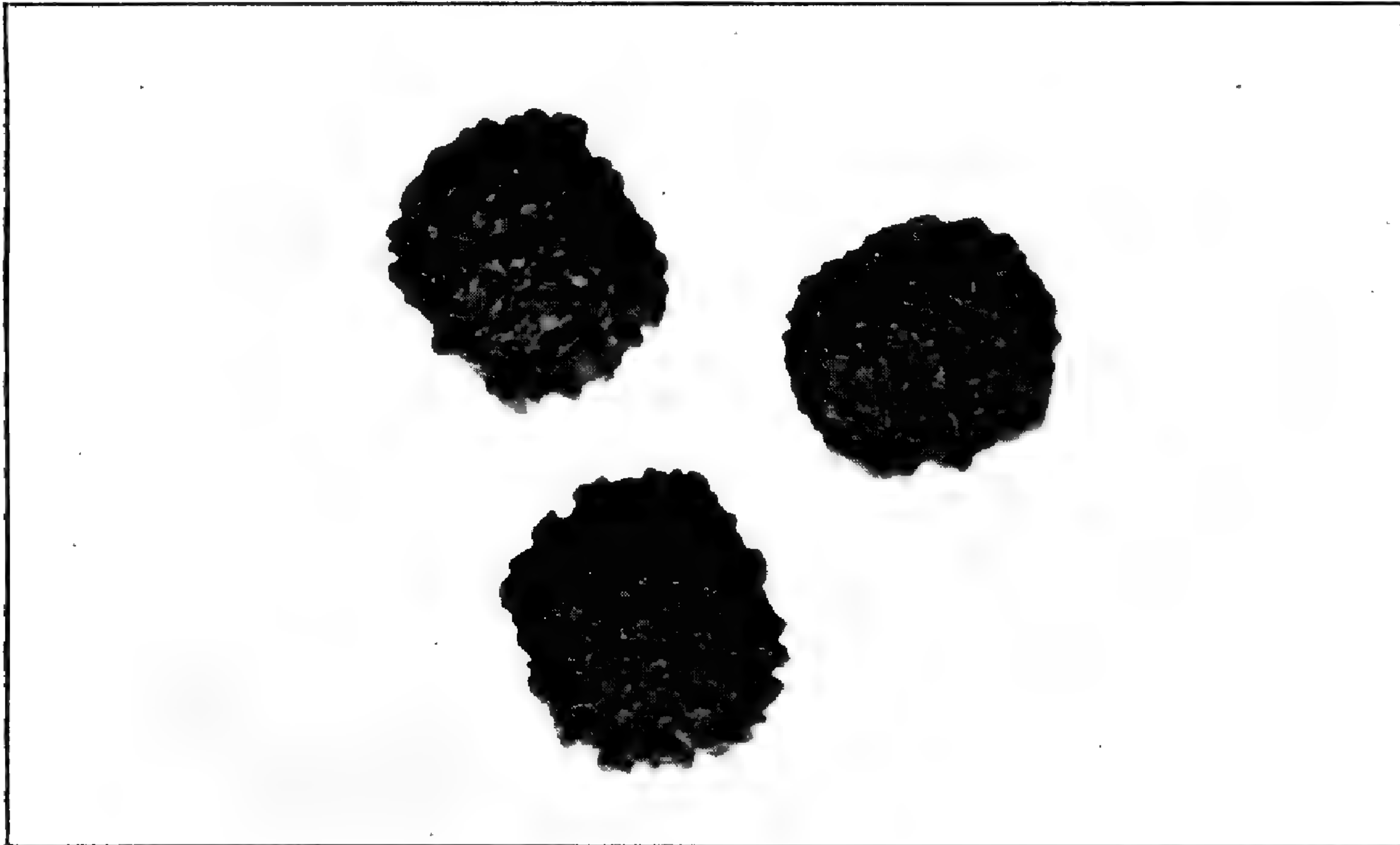
² Doctor Jumelle's description applies better to the young leaves of Mr. Wercklé's specimens. It may refer to the leaves of seedlings, communicated by Mr. Godefroy-Lebeuf.



A. SEEDS OF SAPIUM HIPPOMANE MEYER.



B. SEEDS OF SAPIUM VERUM HEMSL.



C. SEEDS OF SAPIUM TOLIMENSE JUMELLE.



SAPIUM HIPPOMANE MEYER.

mm. long; perianth formed of three free divisions, these ovate-acuminate, rounded at tip, narrowed at the base into a short claw, imbricate, 3 mm. long and 2.7 mm. broad; ovary sessile or subsessile, globose, narrowing into a persistent styler column 3 to 4 mm. long; styles 3, reflexed, early caducous. Male flowers in clusters of 6 to 10, subtended by a short, broad bract and surrounded by a few clavate glandules, the flowers mixed with glandlike bracteoles; perianth yellowish white, campanulate, bilobate, about 3.5 mm. long; stamens 2, exserted.

Capsules sessile or subsessile, large, globose, 18 to 20 mm. in diameter, coriaceous, crowned by the persistent styler column. Seeds lenticular, more or less orbiculate, about 10 mm. long and wide, obtusely cristate on the edge and rarely apiculate.

COLOMBIA: El Chaparral, State of Tolima, in the Magdalena Basin, alt. about 800 meters, *Andrés Rochá* (U. S. Nat. Herb., nos. 690468–690470); same locality, Wercklé, Inst. Fís. Geogr. Costa Rica, no. 17272 (U. S. Nat. Herb., no. 578904).

Sapium hippomane Meyer, Prim. Fl. Esseq. 275. 1818; Pax in Engl. Pflanzenreich IV. 1474: 231. 1912.

PLATES 44, A, 45. FIGURES 79–81.

Sapium hemsleyanum Huber, Bull. Herb. Boiss. II. 6:362. 1906.

Sapium obtusilobum Muell. Arg. Linnaea 32: 116. 1863; Pax, op. cit. 229.

A tree 12 meters high, with a short trunk 32 cm. in diameter at the base, an elongated crown, and horizontal or subascending limbs. Bark smooth, grayish.

Foliage thick, the rather long-petiolate, entirely glabrous leaves covering the whole branchlet. Petioles slender, 1 to 4 cm. long, provided at the upper end with a pair of long (1 to 2.5 mm.), cylindric-conical glands, distant 5 mm. or less from the base of the blade. Leaf blades elliptic, dark green above, paler and finely white-dotted beneath, 5 to 12 cm. long, 2.5 to 5 cm. broad on the floriferous branchlets, 15 to 25 cm. long and 5 to 6 cm. broad on the young, sterile growth; base cuneate or subacute;

apex more or less abruptly contracted and ending in an incurved, cucullate-glandulose tip, often with small lateral auricles; main nerve impressed above, prominent and more or less angular beneath; primary veins slender, arcuate, prominent on both faces, about 18 on the leaves of the floriferous branchlets, 28 on those of the younger growth; margin (slightly revolute in dry specimens) remotely denticulate-glandulose (the glandules caducous) and with occasional larger, hydathodal teeth. Stipules scarious, ovate or subacuminate, very small.

Floral spikes terminal, single or with a basal, axillary branchlet, slender, entirely glabrous, up to 16 cm. long, bearing either male flowers only or both male and female, the female num-

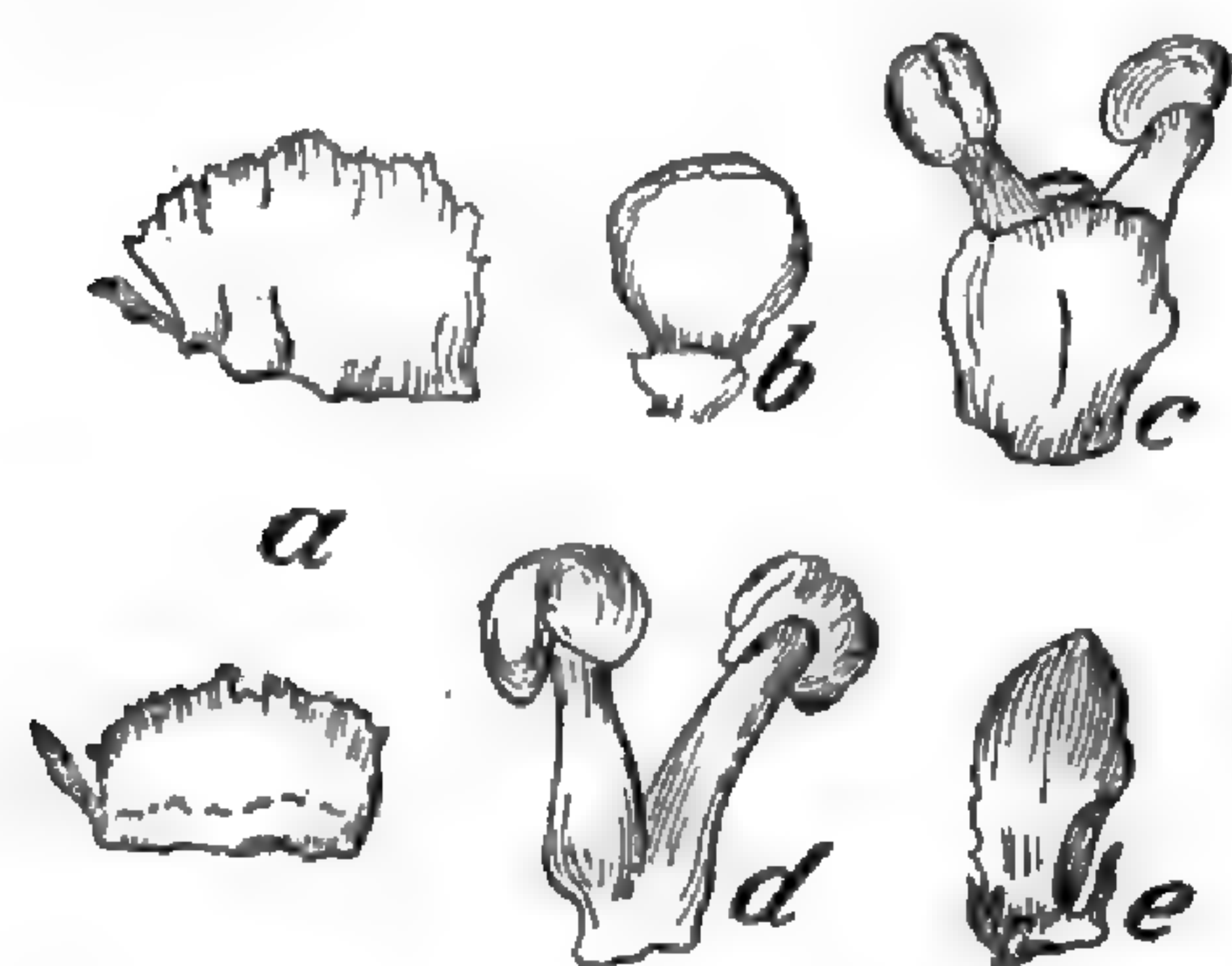


FIG. 80.—Male flower of *Sapium hippomane*.

a, Bracts with lateral glandule; b, floral bud; c, mature flower; d, stamens; e, half of perianth, showing form of lobe and with interfloral glandules at base. All scale 6.

bering up to 10, inserted at the base of the spikes. Floral glands ovate, larger at the base of the spikes (3 to 3.5 mm. long, 2 mm. broad). Bract short and broad (about 15 mm. long and 2 mm. broad), with the upper margin scarious, rounded, glandulose-pectinate or irregularly denticulate, and bearing on one side only (in male flowers) or on both sides (often in female flowers) a basal, erect, clavi-form, purple glandule. Male flowers in clusters of 4 to 8, sessile, intermixed with filiform, glandular, persistent appendages; perianth about 1.5 mm. long, purplish, the two lobules entire and more or less rounded; stamens long-exserted (nearly 2.5



FIG. 79.—Tip of leaf of *Sapium hippomane*. a, Front view; b, lateral view showing auricle. Both scale 3.

mm. long), with yellow filaments and purple anthers. Female flowers provided at the back with two additional bracts, smaller than the outer one, irregularly fringed or denticulate and bearing at the base within several finger-like, dark glandules; perianth 3-lobulate, the lobules more or less ovate-rounded or acuminate, though never acute, at the tip, 1 to 1.5 mm. long, free to the base or almost so; ovary globose, glabrous, 3-locular; styles shortly adnate at the base, up to 5 mm. long, thick, arcuate, green, with a brownish stigmatic surface.

Capsules sessile or very short-pedicellate, coriaceous, 11 mm. long by 13 mm. in diameter, finely rugose and brownish gray outside, 3-celled and each cell monosperm, with both the carpellary divisions and the lines of dehiscence deeply furrowed (the latter yellowish in dry specimens). Seeds medium-sized, with a red pseudoaril, black, lenticular, finely tuberculate, cristate along the margin, distinctly apiculate; length 5.6 mm., breadth 5 mm., thickness 3.6 mm.

JAMAICA: Hope Gardens, a tree derived from a seedling obtained at Medellin, Department of Antioquia, Colombia, and presented by the late Consul Ch. Patin in September, 1899.

I am indebted to Mr. William Harris, superintendent of the Public Gardens of

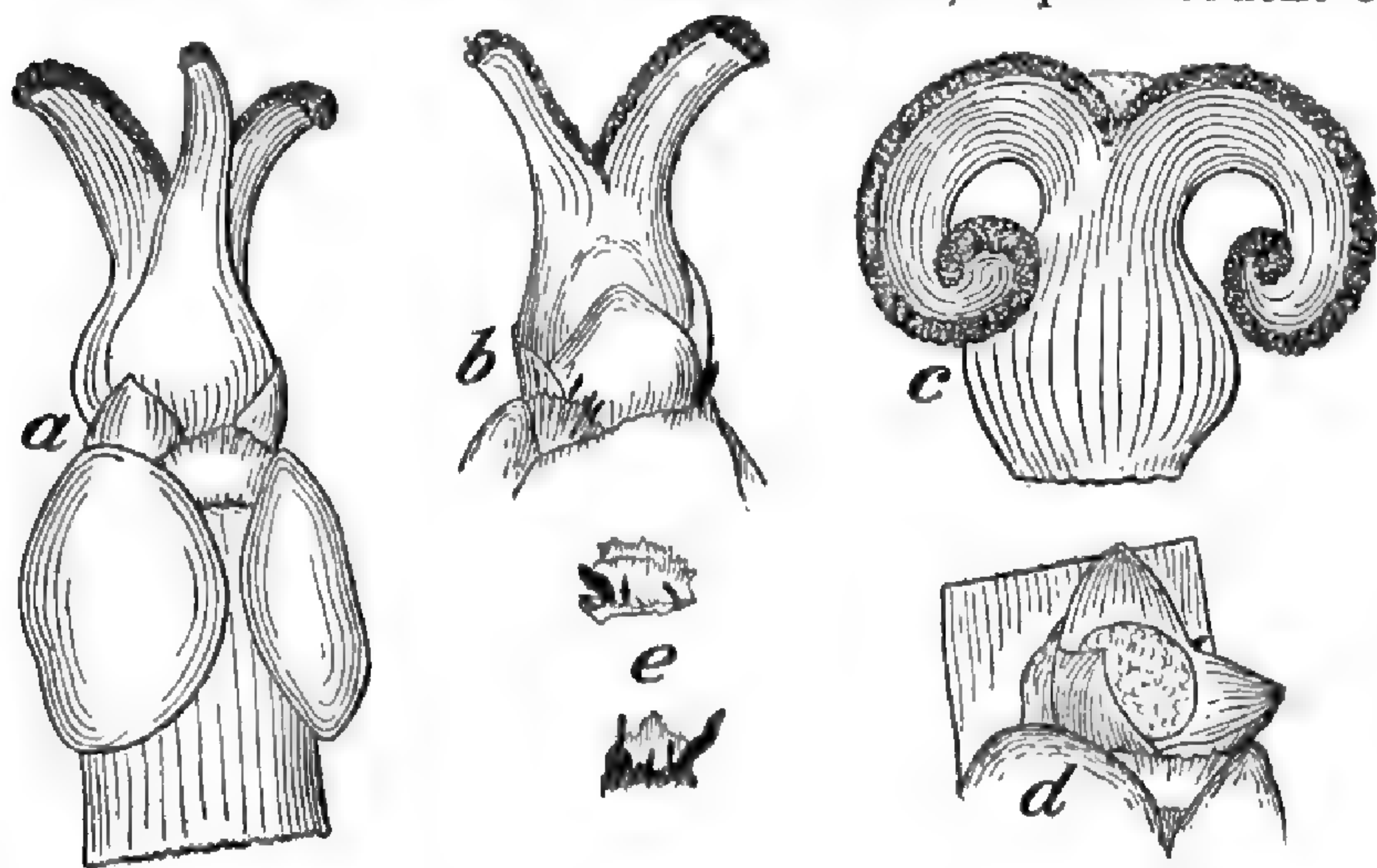


FIG. 81.—Female flower of *Sapium hippomane*. *a*, Young flower, front view, showing glands and bract; *b*, same, back view, showing small bracts and glandules; *c*, mature pistil; *d*, perianth *in situ*; *e*, bractlets and glands on back of flower. All scale 6.

Kingston, for herbarium specimens, materials in alcohol, and interesting notes on this remarkable species. To the Hon. H. H. Cousins, Director of Agriculture of Jamaica, I owe also an acknowledgment for the communication of the original photograph of plate 45.

From Mr. Harris's letters I extract the following information:

We have a *Sapium* here which was presented to us by the

late Mr. Chas. Patin in 1899. He called it *S. biglandulosum*. It is evidently not that species, but may be *S. utile* or an allied species. (July 15, 1910.)

The leaves drop off the branches in drying and it is difficult to get nice specimens, but no doubt they will answer your purpose. I may mention that the leaves of the tree were much larger when it was younger, say three or four years ago. (August 11, 1910.)

We sent flowering specimens of this tree to Kew in 1907 and they referred it doubtfully to *S. obtusilobum*. It did not seem to agree with the figure given in Bull. Herb. Boiss. 6, p. 357 (fig. 17), and I named the tree provisionally *S. utile*. This is the first year that the tree has fruited with us and consequently the first time that we could get complete material for identification.

You will notice in the figure of *S. obtusilobum* in Bull. Herb. Boiss. that the petiolar glands are shown to be at the base of the leaf blade, whereas in our tree these glands are 7 or 8 mm. below the base of the leaf blade. The apical gland is an important character. I find that the capsules are not all sessile, but occasionally one is furnished with a short, thick pedicel.

I hope to send you a photograph of our tree in a few days. Our specimen is a round-headed tree 35 feet high, with a trunk girth of 24 inches at 3 feet from the ground. It is furnished with numerous leafy branches, the lower ones drooping and touching the ground. All parts of the tree, but especially the young shoots and leaves, contain an abundance of milky juice. We received the young plant from the late Mons.

Chas. Patin in September, 1899, and it was planted out in its present position in October, 1902; Hope, with its dry, hot climate, is probably not the most favorable situation for this tree.

The late M. Patin was a planter and Belgian consul at Medellin, Colombia, and I believe the species comes from that neighborhood. M. Patin was keenly interested in plants, especially those of an economic nature, and on his rather frequent visits to Europe or the United States he always stopped at Jamaica and came to see us at the Gardens and usually brought something to add to our collections.

He thought very highly of this *Sapium* as a probable source of rubber and showed me samples of rubber produced by it.

He was very anxious to introduce the species to Jamaica, and I find that he brought four plants in 1899, but two were dead and one was very weak and finally succumbed. (September 22, 1910.)

The examination of the specimens showed that the tree could not be *Sapium utile* Preuss, since it belongs to the subsection *Cucullata* (Pax & Hoffm.); so, in a letter answering those of August 11 (cited above) and 17, and subsequent to that of September 22 of Mr. Harris, I expressed the opinion that the species might be either "*S. obtusilobum* Muell.-Arg. or *S. hemsleyanum* Huber," coinciding in the first surmise with the tentative identification made at Kew. Further study showed that, while our specimens agreed in almost every detail with the incomplete description of the former by Mueller, they differed in several ways from *S. hemsleyanum* Huber. The petioles, namely, are longer, the petiolar glands more distant from the blade, the marginal teeth rather distant and obsolete, the primary veins less numerous, the floral spikes shorter and more slender, the basal bract of the male flowers cut straight or hardly rounded, with a fimbriate margin, etc.—all these differences found while comparing our Jamaican specimens with nos. 7509 and 7674 of Jenman from British Guiana.

But again *S. hemsleyanum* is now considered by Dr. Pax¹ to be the same as, or, at the utmost, a simple form of, a species of broad scope, *S. hippomane* Meyer, in which our Jamaican specimens can also be included. And as, on the other hand, *S. hippomane* and *S. obtusilobum* do not seem to differ in any essential details, the texture of the leaf being rather the result of certain environmental conditions, I feel justified in considering also the name *S. obtusilobum* Muell.-Arg. as merely another synonym for *S. hippomane* Meyer.

The above description and, unless otherwise indicated, the accompanying drawings have been made from our Jamaican materials.

EXPLANATION OF PLATES 44, 45.—Pl. 44, A, B, C, from photographs taken by C. B. Doyle in Washington. About natural size. Pl. 45, from a photograph furnished by Hon. H. H. Cousins, as mentioned in the text.

ANACARDIACEAE.

A NEW SPECIES OF SPONDIAS FROM COSTA RICA.

Spondias nigrescens Pittier, sp. nov. FIGURE 82.

A forest tree with rounded crown (Tonduz in sched.). Branchlets thick, covered with a purplish brown, smooth bark, showing at the end the prominent scars left by the fallen leaves.

Leaves caducous, 5 to 17-foliate, pubescent. Rachis 15 to 30 cm. long, broadly flattened above, rounded beneath, the petiole 5 to 6 cm. long. Leaflets subopposite, distant about 3 cm. on each side of the rachis; petiolules of the lateral leaflets 7 mm. long, that of the terminal leaflet up to 1 cm. and over; leaflet blades ovate to elliptic-oblong, moderately oblique, rounded or subcuneate at the base, acuminate and acute at the tip, 3.5 to 10 cm. long, 1.5 to 3.5 cm. broad, the smallest ones at the base and the narrowest at the end of the leaf; margin entire; primary veins parallel, arcuate, 10 to 14 on each side of the main rib.

¹ In Engl. Pflanzenreich IV. 1474: 232. 1912.

Panicle 20 to 30 cm. long, lax, few branched, the rachis densely pubescent. Flowers white, borne on articulate, hispid-pubescent pedicels 1.5 to 2.5 mm. long, these provided at the base with several diminutive bractlets. Calyx lobes smooth, broadly ovate, more or less acute at the tip, about 1 mm. long and broad. Petals lanceolate-acute, 3.5 mm. long, 1.5 mm. broad near the base, reflexed and strongly revolute on the margin. Stamens seldom over 1.5 mm. long; filaments broader at the base;



FIG. 82.—Floral details of *Spondias nigrescens*. *a*, Floral bud; *b*, open flower; *c*, sepal; *d*, petal; *e*, stamens; *f*, gynoecium. All scale 6.

anthers about 0.5 mm. long. Disk thick, the margin obscurely 10-crenate or sulcate. Ovary subglobose, sparsely hairy, ending always in 4 more or less reflexed, glabrous styles, with a total height of 1.5 to 2.5 mm. Drupe ovoid, hairy-pubescent in its young state; the mature fruit not known.

Type in the U. S. National Herbarium, no. 861287, collected in the forests of Nicoya, Costa Rica, May, 1900, by A. Tonduz (Inst. Fís. Geogr. Costa Rica, no. 13925). The specimens bear flowers and young fruits.

Of the genus *Spondias* three species, or perhaps only two, have been known hitherto in Central America, one or two of them (*S. purpurea*, *S. dulcis*) in a state of semicultivation; the other (*S. lutea*) a large forest tree, which is certainly indigenous, notwithstanding Seemann's assertion of its having been introduced in Panama. The discovery by Mr. Tonduz of a second native species is highly interesting.

SAPOTACEAE.

ZAPOTES AND ZAPOTILLOS.

In a recent paper¹ Mr. O. F. Cook has shown that the binomial *Achras zapota* of the first edition of Linnæus's *Species Plantarum* is based upon the type of Plumier's *Sapota*; in other words, on the tree known over most of its area in Central and South America as "níspero," in Mexico and Guatemala, as "chicozapote," or erroneously as "zapote chico," and in the British West Indies as "sapodilla." Mr. Cook agrees in this with the European botanists and any further reference would be uncalled for but for the fact that, owing to a misidentification of Plumier's plate, the name *Sapota zapotilla* Coville was substituted in 1905 and has since been used by the American botanists who have dealt with that well-known fruit tree of the Tropics.

On the other hand, the naming of an allied species, the zapote tree, also important economically, has resulted in an unfortunate imbroglio. Originally placed in the genus *Sideroxylum* by Jacquin (1760), then in *Achras* by Linnæus (1762), and used to resuscitate Plumier's genus *Sapota* in 1768, it was transferred to *Lucuma* by Gaertner in 1807 and to *Vitellaria* by Radlkofer in 1882, while Pierre created successively for it the two names *Calospermum* and *Calocarpum* in 1890 and 1904,

¹ Nomenclature of the Sapote and Sapodilla, Contr. U. S. Nat. Herb. **16**:279-282. 1913. Also Journ. Washington Acad. Sci. **3**:158-160. 1913.

the last being rejected in the paper referred to by Mr. Cook, who proposes *Achradelpha* as a definite substitute. This would be the eighth change of the generic status of the zapote tree, an extraordinary fate, indeed, with very few parallels in botanical taxonomy.

For brevity's sake the reasons will not be repeated here why the zapote had no standing in any of the first six of the genera just cited. Those who wish for a full explanation of the case are referred to Mr. Cook's very complete presentation of it. This is the place, however, to state my reasons for differing from my colleague as to the necessity of a new generic name.

My contention is that *Calocarpum* is a perfectly valid name and therefore has to be preserved. It is neither a taxonomic nor even a philologic homonym of *Callicarpa*. Indeed, the two vocables are so distinct from each other as even to escape in a way the criticism of being synonyms. A taxonomic homonym is a word (the same word with the same spelling, as I understand it) that has been used to name distinct genera. Thus *Calospermum*, as applied to an alga genus and to the zapote, is both homonymous and homophonous, and had to be rejected in its second application. *Donatia* Forst., *Donatia* Bert., and *Donatia* Loebl. were perfect homonyms, of which only the earliest, first mentioned, could be used. The use of names differing only by their ending in -us, -a, or -um should be absolutely discouraged, as well as that of all those homonymous in the usual sense of the word, that is to say, agreeing in sound and more or less in spelling. But in our case we can reasonably contend that *Callicarpa* and *Calocarpum* are quite heteronymous and can not therefore be confused nor identified as one single term. It is true that these two words are very similar, but they differ in formation, spelling, and pronunciation. The principle of exclusion of generic names should never be extended to such cases, and there is apparently no well-grounded reason to drop *Calocarpum* and to encumber the already too intricate nomenclature of the genus with a new name. The preservation of Pierre's name does not interfere in any way with the American method of types and serves as well as any other to permanently fix the nomenclature of the zapote type.

As to the specific name of the type species, the priority of *Calocarpum sapota* over *C. mammosum* could perhaps be sustained, since Jacquin's name *Sideroxylum sapota* is anterior by two years to Miller's *Sapota mammosa*. But in order to avoid the confusion which may result from the use of a homonymous specific name in two closely related genera, and because *mammosum* or *mammosa* has been used through no less than seven changes of the generic name, I agree with Mr. Cook as to the convenience of retaining it as the specific designation of the zapote.

With reference to the vernacular nomenclature of the same trees, it seems necessary to insist on the fact that the name "chicozapote," sometimes wrongly given as "zapote chico," as applied to the sapodilla, is not intended as a counterpart of "zapote grande," an expression used rarely, if at all, in connection with *Calocarpum mammosum*. "Chicozapote" is simply a modern form of the Nahuatl name "tzicozapotl", or "gum zapote", still used by the native Indians of Mexico. This term, "chicozapote," besides, is known only in the restricted northwest end of the natural range of *Achras zapota* and "níspero" is a name of much more general use, borrowed from the Castilian denomination for *Mespilus germanica*. On the other hand, I do not remember ever having heard the expression "zapote grande" used by the natives of Mexico and Guatemala, "zapote" being the name of the fruit all over the natural territory of the species, while in the countries where it has been introduced it has generally been compared with and named after the mamey or mamee (*Mammea americana*).

The spelling of the native name "zapote," as used by Mr. Cook and authorized by the more recent English dictionaries, is not exempt from criticism. Following the rules of derivation, the *z* initial should be preserved. That "zapote" proceeds from the Nahuatl "tzapotl" is not a mere supposition, but a well-established fact. In passing to the Spanish language, it has dropped the initial "t," in accordance with one of its universally adopted rules. "Zapote" is a Spanish word, figuring in Spanish dictionaries, and as such its original spelling should be respected. "Sapodilla" is an English name derived from "zapotillo." It is unfortunate that the word was originally misspelled, but a mistake once made is no reason for a repetition. As Mr. Cook further observes, "sapodilla" has only a limited use, and that is why I prefer "zapotillo," which is currently applied to several species of the same family.

***Achras zapota* L. Sp. Pl. 1190. 1753.**

PLATES 46, 47.

Achras sapota L. Sp. Pl. ed. 2. 1: 470. 1762.

Achras zapota zapotilla Jacq. Stirp. Amer. 57. 1763.

Sapota achras Mill. Gard. Dict. ed. 8. no. 1. 1768.

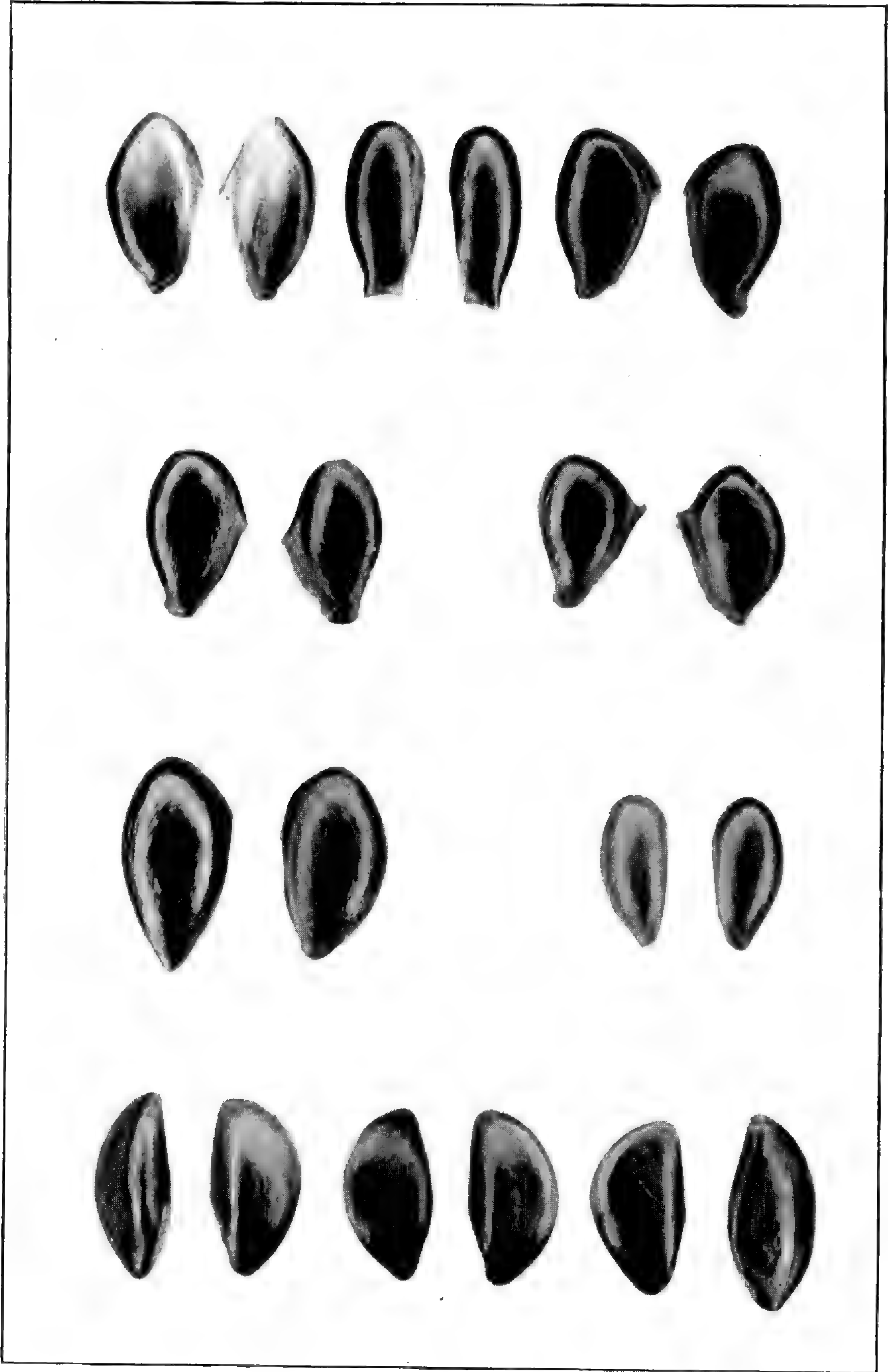
Sapota zapotilla Coville, Contr. U. S. Nat. Herb. 9: 369. 1905.

A portly tree reaching to 20 meters and over when fully grown. Trunk either short and dividing into several secondary axes or undivided to the top. Main limbs horizontal or drooping. Crown rounded or elongate, richly foliated. Bark brownish, lactescent, more or less furrowed longitudinally. Terminal branchlets rather thick, with a grayish or ferruginous, filmy surface, covered with leaf scars.

Leaves petiolate, coriaceous, clustered at the ends of the branchlets. Petioles 1 to 2.5 cm. long, rather slender, sometimes glabrous, more usually more or less covered with a filmy down. Leaf blades 5 to 14 cm. long, 2.5 to 5 cm. broad, ovate-elliptic to elliptic-lanceolate, rounded-cuneate at the base, more or less obtuse and emarginate at the tip, dark green above and paler beneath, perfectly glabrous at the mature stage but covered beneath when young with a ferruginous film; main rib salient below, the venation parallel and close, scarcely distinct; margin smooth. Stipules none.



ACHRAS ZAPOTA L.



SEEDS OF ACHRAS ZAPOTA L.

Flowers pediceled, single in the axils of the leaves at the ends of the branchlets. Pedicels 1 to 1.5 cm. long, more or less covered with filmy pubescence. Sepals 6, seldom 8, ovate-acuminate, 9 mm. long, 5 mm. broad, densely velvety-hairy except at the base inside, the exterior ones more or less valvate, the interior narrower at the base and apart from each other. Corolla white, glabrous, tubular, urceolate or campanulate, about 10 mm. long and lobulate at the top; lobules about 2.5 mm. deep, ovate, the margin more or less irregularly sinuate and coarsely denticulate at tip. Stamens 6, opposite the lobules of the corolla; filaments short (about 1 mm. long), broad at the base, inflexed and more slender at tip, inserted on the corolla at about 6 mm. from the base; anthers basifix, lanceolate-acuminate, cordate at base, extrorse, with longitudinal dehiscence. Staminodes 6, petaloid, of the same length as the lobules of the corolla and with a more or less sinuate margin. Pistil 10 to 11 mm. long, claviform and stiff; ovary hairy, 10 to 12-celled, each cell 1-ovulate; style smooth, obscurely lobulate and hairy at tip.

Fruit a berry of variable form and size, crowned by the remnants of the persistent stigma and with a thick, verrucose pedicel. Skin thin, brown ferruginous, more or less smooth or scaly. Mesocarp fleshy, succulent, containing usually from 0 to 5 and very seldom 10 to 12 seeds. Seeds brown or black, smooth and shiny, more or less flattened laterally, oblique and obovate, with a narrow cicatricula extending from the lower end to about the middle of the ventral side, where the foramen is usually marked by a more or less pronounced rostrum. Albumen abundant; embryo at the lower part of the seed.

COMMON NAMES: West Indies, sapodilla tree, naseberry tree (English). Danish West Indies, *mispelboom* (Dutch); *Breiapfelbaum* (German). French West Indies, *sapotil-lier* (French). Porto Rico, Cuba, Venezuela, Colombia, Panama, Costa Rica, Honduras, Nicaragua, Salvador, *níspero* (Spanish). Cuba, *zapote* (Spanish). Mexico, Guatemala, *zapote chico*, *chico*, *chicozapote* (Spanish). Ecuador, *níspero quitense* (Spanish). Yucatan, *ya* (Maya). El Salvador, *muyozapot* (Nahuatl). Mexico, *tzicozapotl* (Nahuatl). Costa Rica *korób* (Brunka). Bluefield, Nicaragua, *ibán* (Misquito). Vera-paz, Guatemala, *muy* (Kekchí and Pokomchí).

The sapodilla tree is certainly indigenous in Mexico south of the Isthmus of Tehuantepec or of a parallel a little farther north, in Guatemala, and possibly in Salvador and northern Honduras. It is especially abundant in the lowlands of Tabasco and Chiapas and the western part of Yucatan, where lie the principal centers of production of the chicle gum. Farther north, as well as in Nicaragua, Costa Rica, Panama, and the West Indies, it seems to appear only as a cultivated tree. Humboldt, in referring to it, says, "Crescit et colitur prope Cumana, Caracas, etc."¹ It is also reported by Planchon² as being abundant in the forests of Venezuela and Jamaica, and from my own recent observations I feel also inclined to believe it a native of the former country, as well as of Colombia.

It was made known from Nicaragua by Oviedo,³ who called it the best of all fruits and expressly mentions that it was "in the power of the Indians of the Chorotegan stock (*esta fructa está en poder de los indios de la lengua de los chorotegas*), who are known to have migrated from the North, following the coast of the Pacific Ocean as far as Costa Rica. On the eastern seaboard of this last country, however, it is positively said to have been brought from Jamaica in recent times. There do not seem to be any available data as to its introduction into other countries of Tropical America. In Ecuador it was well known in Velasco's time as a specialty of Quito.⁴ We have

¹ H. B. K. Nov. Gen. & Sp. 3: 239. 1818.

² Planchon, L. Produits des Sapotées 82. 1888.

³ Oviedo y Valdés, Gonzalo Fernandez de. Historia general y natural de las Indias 308. pl. 1. 1851.

⁴ Velasco, J. Historia del Reino de Quito 63. pl. 1. 1844.

seen, on the other hand, that the tree was frequently described from the West Indies in the course of the eighteenth century. It may have reached Cuba from Yucatan in prehistoric times and spread from there to the other islands.

Although it is seldom met with in Central America and Mexico above 1,000 meters, the upper limit of the *tierra caliente*, the *sapodilla* tree reaches far up into the temperate belt of Colombia and is even grown around Quito, in Ecuador, at an altitude of about 2,800 meters.

The adult trees seem to vary greatly in size according to locality. Cook and Collins¹ give 7 to 9 feet (2 to 3 meters) for its stature in Porto Rico; Jacquin² gives 10 to 15 feet (3 to 5 meters); P. Browne³ says that it "rises to a considerable height." In Guatemala and Colombia I have often seen specimens 18 meters high and over. As a general rule, it seems that the tree is of a lower stature in the West Indies. The specimens seen by me in Port Limon and on the plains of Santa Clara in Costa Rica were also of less size and more densely foliated than those on the Pacific coast. This can, however, be accounted for by differences of age, climate, and other local conditions.

Pierre⁴ has described several varieties which have not been found among the numerous specimens investigated in connection with the preparation of this paper.⁵ Frequent and considerable variation was noted in the relative length of the calyx and corolla, or of the latter's lobules and the staminodes, these being in most cases adherent to the lobules and not free above the insertion of the stamens as represented by Engler.⁶ With reference to the general form of the flowers an old observation of Loeffling was confirmed and thus quoted by Jacquin:⁷ "Flores inodori, corolla albida, diu persistentes. Hi ante fecundationem figuram habent ovatam, in ipso autem fecundationis actutoti explicantur magis, ut evadant campanulati; quod, ut ista succedat, antherae inclusae stylusque corolla longior videntur exigere: unde tunc in situ figuraque mutatio partibus accidit insignis. Fecundatione auctem peracta, ovatam denuo assumunt. Extra hunc actum florem descripsisse videtur beatus Loefflingius, cujusmodi ipse illum ego saepissime examinavi: addidi igitur characterem, qualem in ipsamet fecundatione semper se mihi exhibuit."

The seeds also vary widely, not only in number but also in shape, as can be seen from the accompanying plate. As to their number, I found that in the Cauca Valley it is usually not over three and very often less, and it was with no little surprise that I saw later in Velasco a reference to the Ecuador fruit as being also 3-seeded, while my own experience in Central America, as well as that of most authors, indicates a larger number. On the occasion of a recent trip to Venezuela, where the fruit is a

¹ Contr. U. S. Nat. Herb. 8: 66. 1903.

² Loc. cit.

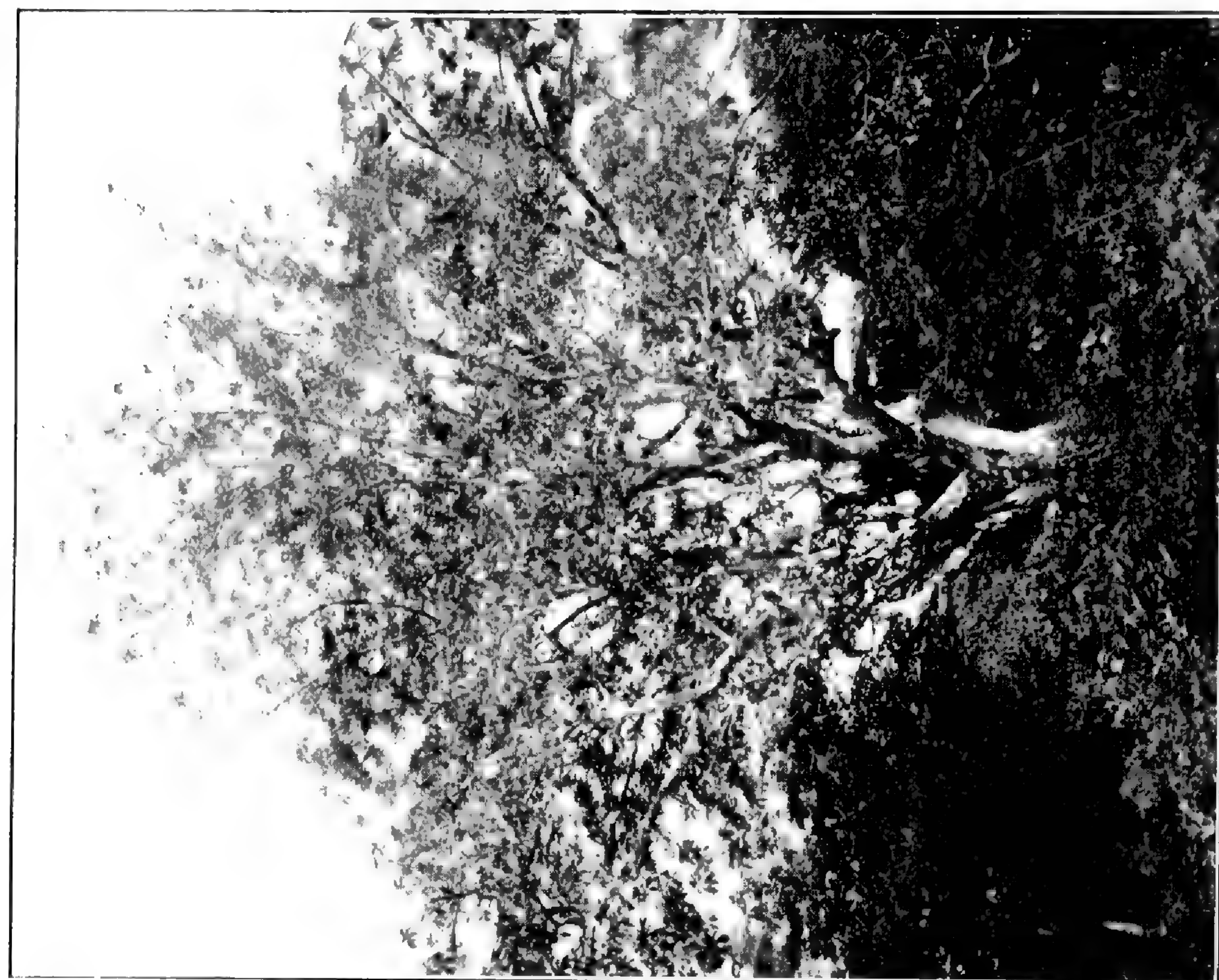
³ Civ. Nat. Hist. Jam. 200. 1789.

⁴ In Urban, Symb. Antill. 5: 97. 1904.

⁵ In the course of my recent investigation of the flora of Panama, I discovered a remarkable variety of this species at Patiño, on the southeastern shore of San Miguel Bay. The tree is rather small, not reaching over 8 meters high; the trunk is straight and the branching divaricate, almost horizontal, with the lower limbs drooping; the crown, the lower part of which is only about 1.5 meters above the ground, is regular and oblong-elongate. The tree was loaded with fruits, *these forming dense clusters at the end of the branchlets*. The peduncles are 1.5 to 2 meters long; the berries themselves not over 4 cm. in diameter and 3.5 cm. long, globose-depressed in shape; the scaly skin is gray, the mesocarp greenish yellow, and the seeds, usually 5 to 7 in number, *always without rostrum*. According to the information obtained at the place, the tree is commonly found in the surrounding woods, and goes under the name of "níspero de monte."

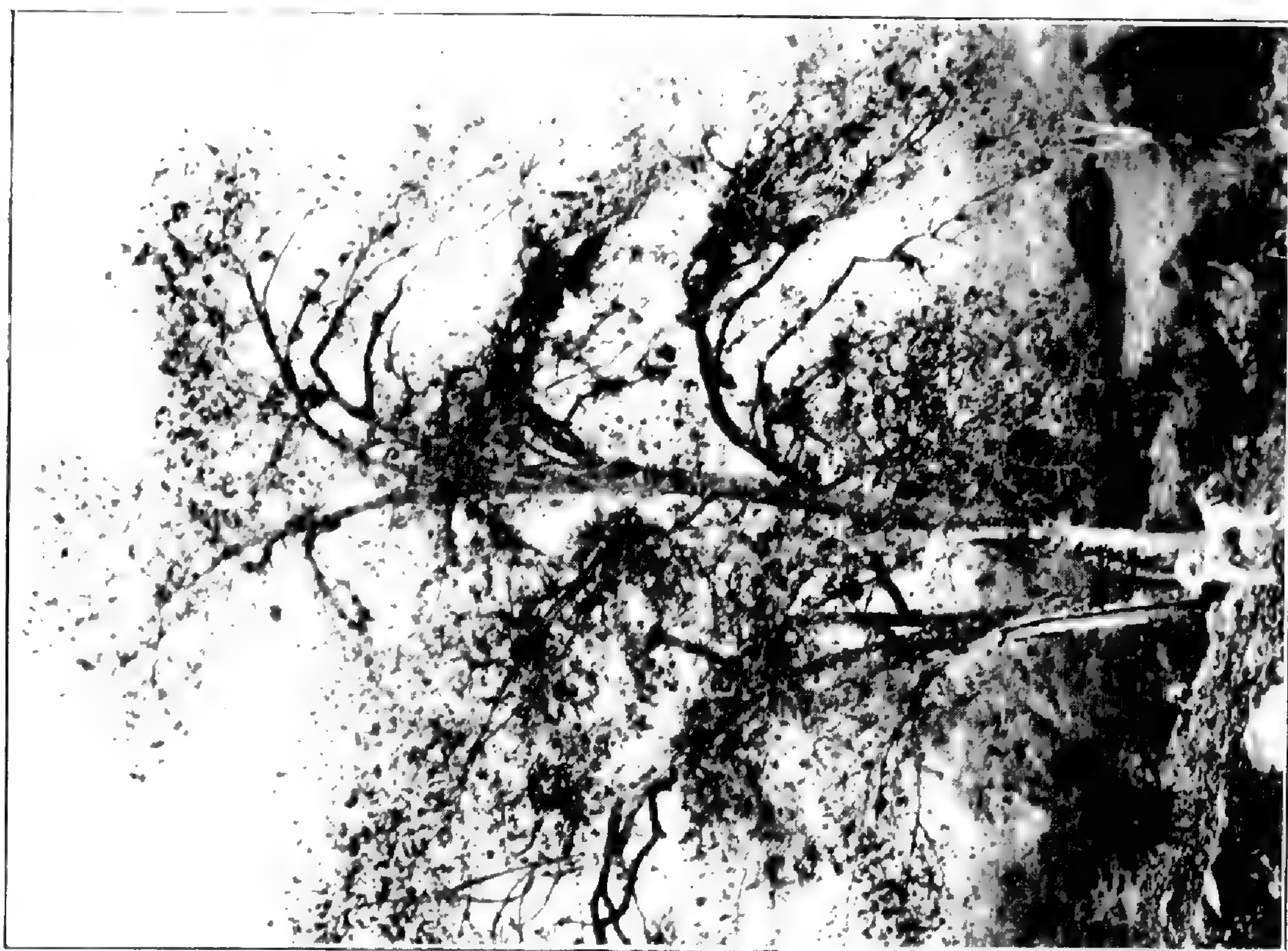
⁶ Pflanzenfam. 4¹: 197. 1889.

⁷ Stirp. Amer. 58. 1763.

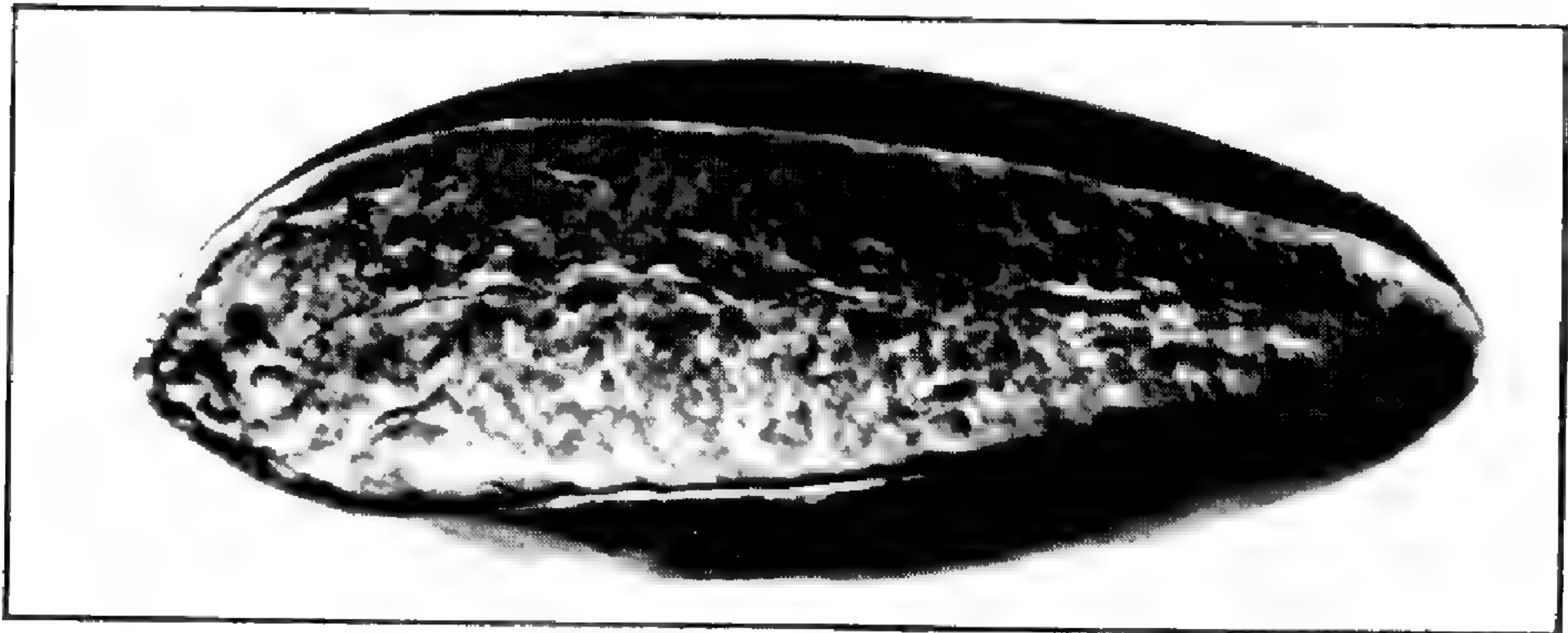
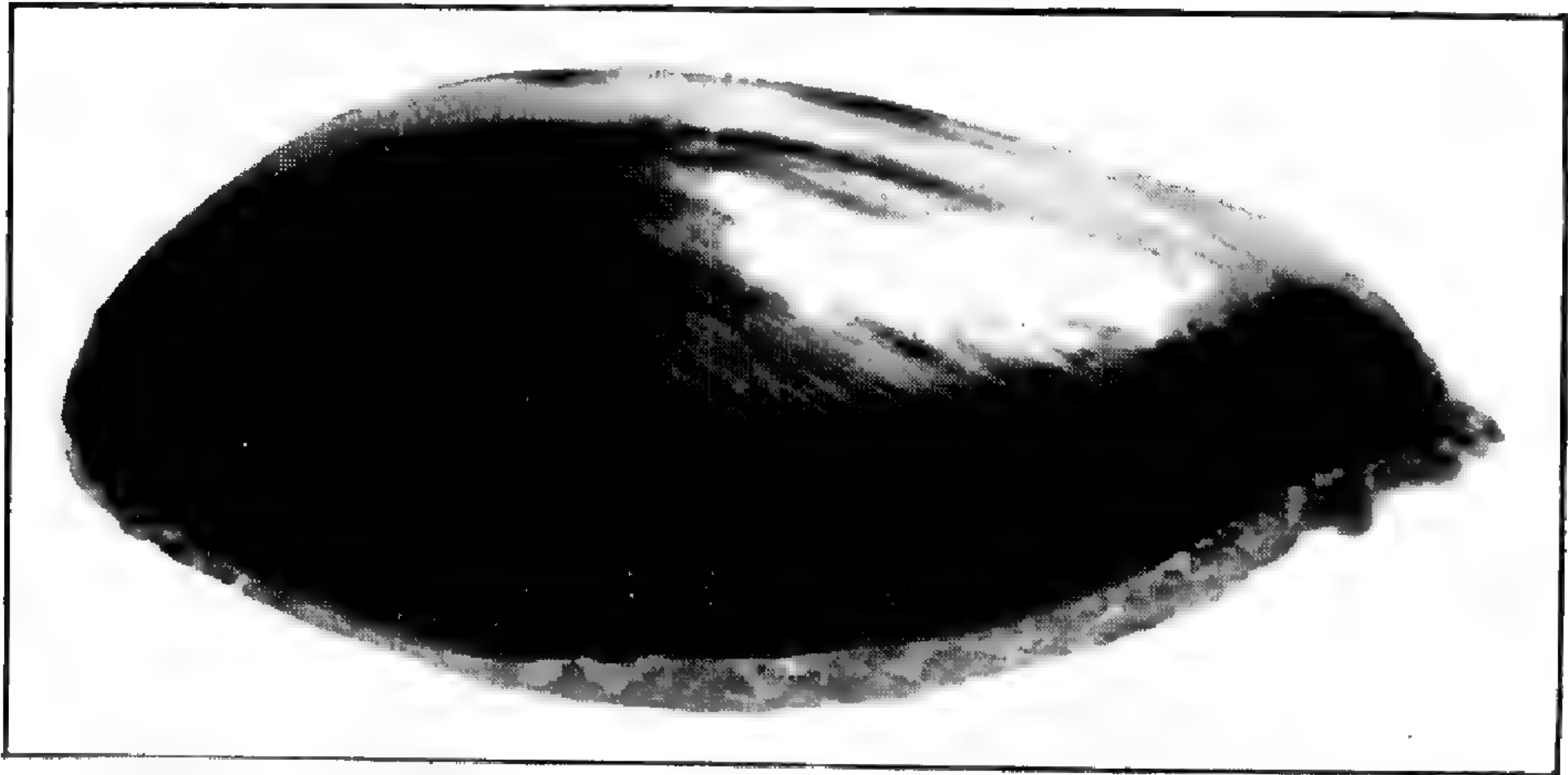


B.

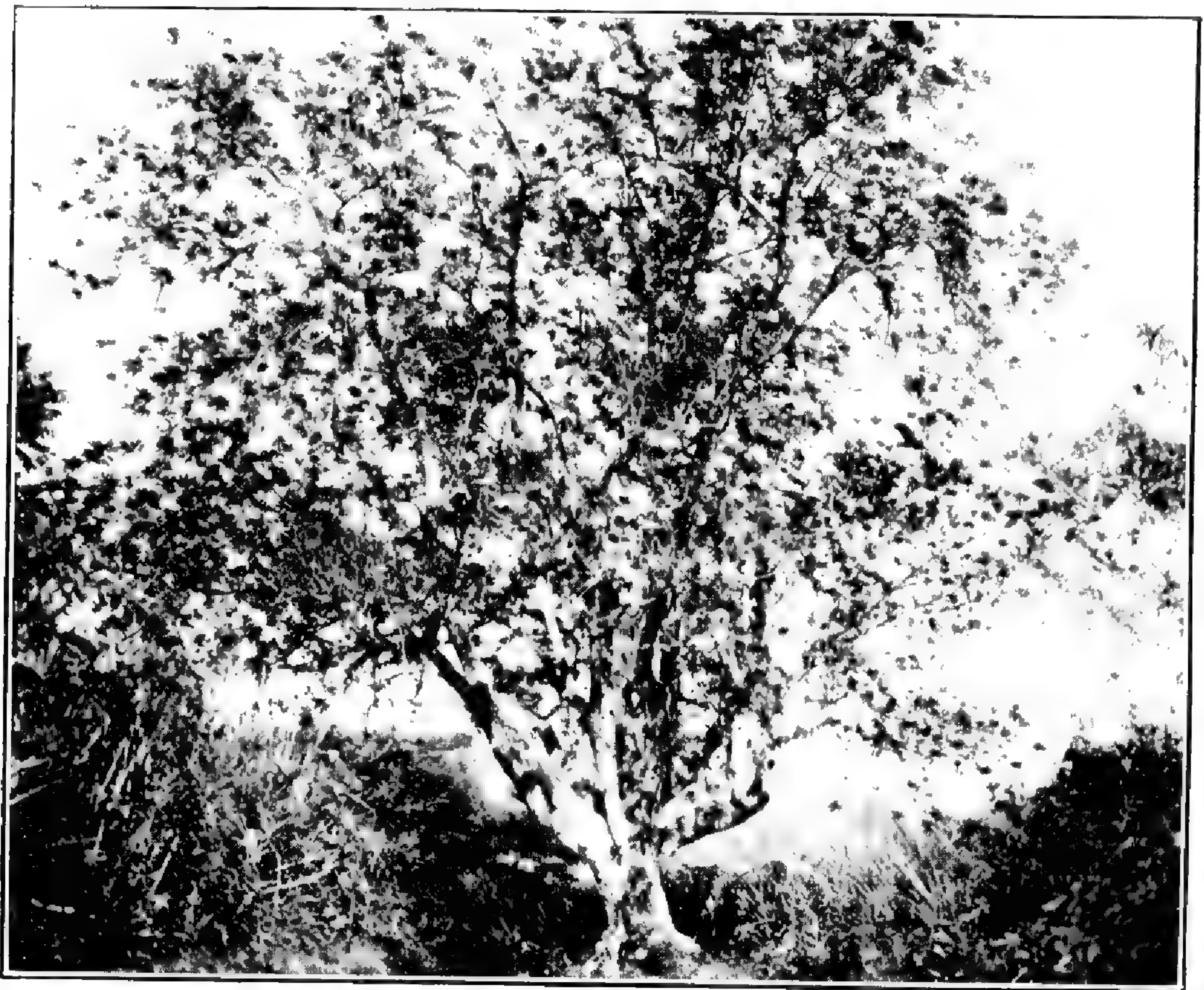
A, B. *CALOCARPUM MAMMOSUM* (L.) PIERRE.



A.



A. SEEDS OF *CALOCARPUM MAMMOSUM* (L.) PIERRE.



B. *CALOCARPUM MAMMOSUM* (L.) PIERRE.

common article of consumption, I investigated a large number of specimens and found the seeds to vary usually in number from 0 to 5.

Mr. G. N. Collins, who has paid special attention to the fruits from the economic standpoint in his travels in Central America and the West Indies, has brought back specimens of three types. An ovate and small type (5 to 6 cm. long, 4 cm. in diameter) seems to be commonest; another, observed in Jamaica, assumes a more spherical shape (diameter about 8 cm.) and is considerably larger; while a third, from Oaxaca (Mexico), has just the shape and dimensions (5 cm. high, 8 cm. in diameter) of an ordinary apple.

The naseberry or sapodilla is regarded by many as one of the best tropical American fruits. The skin is thin, the meat reddish, somewhat milky, melting, and sweet, with a peculiar flavor. If picked at the right time and handled carefully, this fruit will keep from 8 to 12 days, and there is no reason why it could not reach our markets. Moreover, the broad altitudinal range of the tree above mentioned, that is, between 0 and about 2,800 meters, leads to the supposition that there are well-differentiated and hardy mountain varieties that could be made to grow and bear fruit farther north in the United States than Florida and southern California, where the Cuban and Mexican kinds have been tried with encouraging results.

The sapodilla tree has a further importance as being the source of the "chicle" or chewing gum of commerce. That substance is the condensed latex of the tree and is extracted on a large scale in the forests of Tabasco and Chiapas, whence it is shipped, mainly to this country. The sapodilla wood is of fine texture, hard, and reddish, with darker veins, and is of current use in the building of the native carts. The infusion of the bark is sometimes administered as a febrifuge, while the seeds are said to be diuretic and very effective also in the cure of certain diseases of the bladder. According to other information, however, the first is only a poor substitute for quinine, and the use of the seeds can provoke serious accidents.

On account of the sweetness of its fruits, the sapodilla tree attracts many guests of the animal kingdom, such as birds, bats, squirrels, and others. Jacquin gives a lively description of the struggles that go on under its dense cover, the frugivorous hokoes, wild turkeys, and other fowls being an easy prey to carnivorous enemies, not excepting the native hunter.

EXPLANATION OF PLATES 46, 47.—Pl. 46, from a photograph taken by C. B. Doyle at Cali, Colombia. Pl. 47, from photographs taken by Doyle in Washington. The seeds in the lowest row are from the tree referred to in footnote 5, page 80. Both natural size.

Calocarpum mammosum (L.) Pierre in Urban, Symb. Antill. 5: 97. 1904.

PLATES 48-51. FIGURES 83, 84.

Achras mammosa L. Sp. Pl. ed. 2. 469. 1762.

Sideroxylum sapota Jacq. Enum. Pl. Carib. 15. 1762.

Lucuma mammosa Gaertn. f. Fruct. & Sem. 3: 129. pl. 203. 1805.

Lucuma bonplandia H. B. K. Nov. Gen. & Sp. 3: 240. 1818.

Vitellaria mammosa Radlk. Sitzungsber. Math.-Phys. Akad. München 12: 296, 316, 325. 1882.

Calospermum mammosum Pierre, Notes Bot. Sapot. 11. 1890.

Achradelpha mammosa Cook, Journ. Washington Acad. Sci. 3: 160. 1913.

A large tree, 10 to 30 meters high, lactiferous, deciduous, with an erect, usually short, trunk, the crown either spreading and rounded-depressed or narrow and elongate. Ramification dichotomous. Bark reddish brown, shaggy. Branchlets thick, densely tomentose at first, then subglabrous.

Leaves caducous, petiolate, clustered at the terminal, newest part of the branchlets. Petioles 2 to 5 cm. long, broad, flattened, and tomentose at the base, more or less rounded, subcanaliculate, and more or less hairy toward the blade. Leaf blade obovate to oblanceolate, long-cuneate at the base, rounded to acute at the tip, 10 to 30 cm. long, 4 to 10 cm. broad, light green above, paler or brownish beneath, quite glabrous or slightly pubescent on the costa and primary veins on both sides; margin entire;

nervation impressed above, prominent beneath; primary veins 14 to 25 on each side of the main nerve.

Flowers pedicellate or subsessile, in numerous glomerules of 2 to 6, inserted in the defoliate axils of the penultimate growth. Pedicels 1 to 3 mm. long, hairy-tomentose. Sepals about 9 (8 to 10), imbricate, increasing gradually in size from the exterior, basal one to the innermost, 2.5 to 6 mm. long, 3.5 to 6.5 mm. broad, but the exterior much broader than long, the interior almost round, all more or less contracted at the base, emarginate or bilobate at the tip, appressed-hairy outside, smooth inside, the

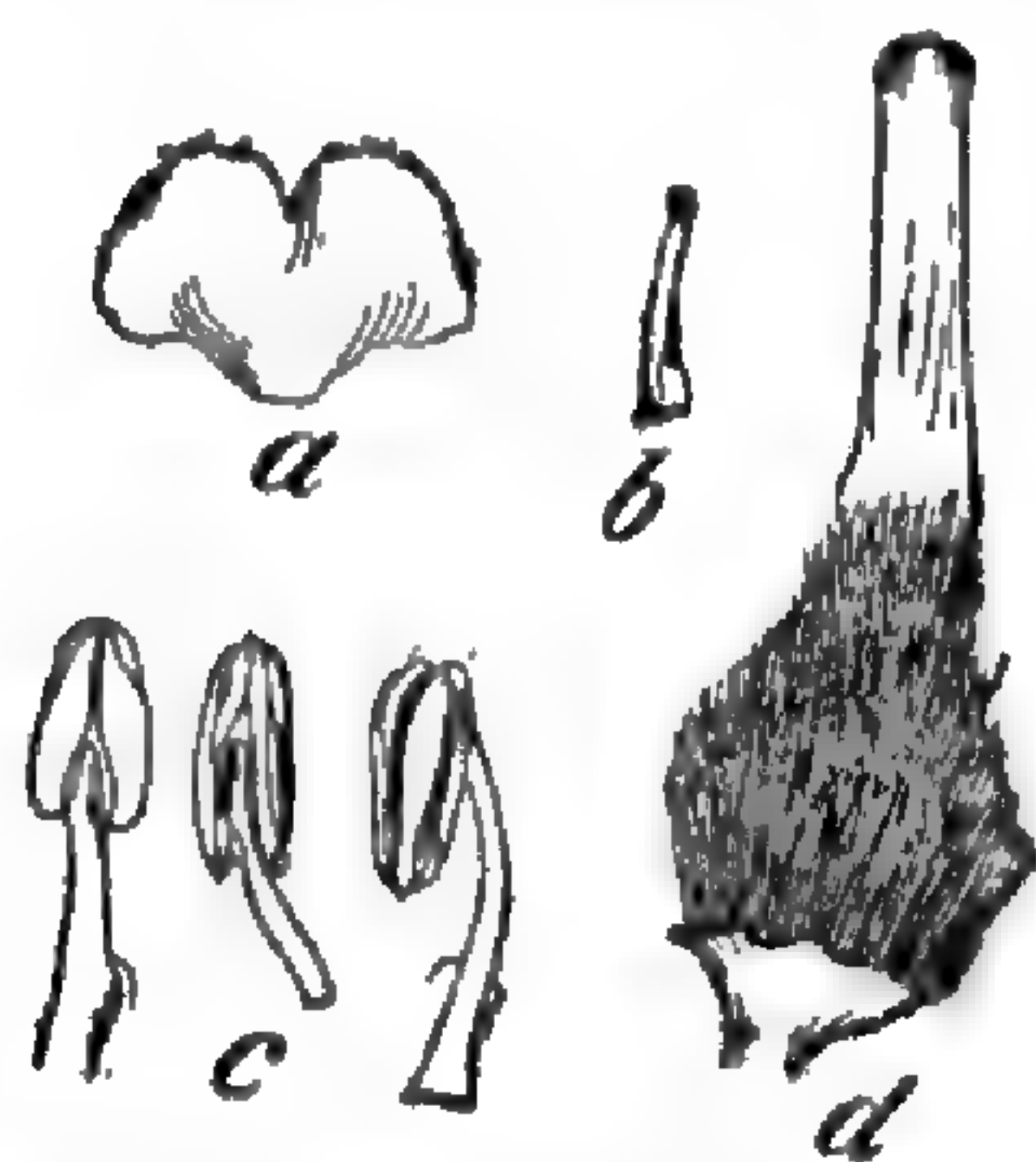


FIG. 83.—Floral details of *Calocarpum mammosum*. a, Outer sepal; b, staminode; c, stamens; d, pistil. All scale 3.

larger ones with a smooth, scarious margin. Corolla 9 to 10 mm. long, sallow white, 5-lobate; tube glabrous; lobes more or less imbricate, slightly longer than the tube (about 5.5 mm. long), ovate, rounded and obscurely emarginate or dented at tip, silky-hairy on the back but with a glabrous marginal zone, ciliate. Staminodes 3 to 4 mm. long, rather narrow, short-pubescent. Stamens 5, glabrous, inserted slightly lower than the staminodes; filaments attenuate, 4.5 to 5 mm. long, subulate and incurved at tip; anthers elliptic-ovate, inserted a little below the middle, at first erect and then reversed; connective slightly exceeding the tip of the anther. Pistil clavate, about 9 mm. long; ovary stiff-hairy, the cells normally 5, but more or less obliterated; style conical-

elongate, smooth or obscurely 5-sulcate, slightly shorter than the corolla, obtuse at tip.

Fruit a large, monospermous, almost sessile berry, varying from globose to almost fusiform, rounded at base, more or less acute at the apex, 8 to 20 cm. long, 6 to 12 cm. in diameter; skin rather thin (1 to 2 mm.), cinnamon brown, rugose-paleate; mesocarp thick, fleshy, reddish or pinkish. Seed large (about 8 cm. long), fusiform-depressed, shiny, of a pale or yellow brown color except the umbilical area, this white, rugose, narrowly elliptic-acuminate in form, extending from one end to the other of the ventral side.

COMMON NAMES: West Indies, sapote, mamee-sapote, marmalade fruit (English). Martinique, Guadeloupe, *zapotte*, *grosse zapotte*, *zapotte à crème* (French). Cuba, *mamey*, *mamey zapote* (Spanish). Mexico, Central America, Colombia, Ecuador, *zapote* (Spanish). Mexico, *tzapotl* (Nahuatl); *tsapas sabani* (Zoque). Yucatan, *zapote mamey* (Spanish); *haaz*, *chacal haaz* (Maya).

Venezuela, Colombia, Ecuador, *mamey colorado* (Spanish). Guatemala, *sal-tul* (Kekchí); *tul-ul* (Pokomchí); *chul* (Mame); *chul-ul* (Jacalteca). Costa Rica, *bko* (Cabécar); *kurók* (Bribí); *kóm-kra* (Brunka); *fiú* (Térraba). Panama, *oa-bo* (Guaymí).

The shape of the leaves and fruits, the degree of pubescence of the former and of the flower, the number of the segments of the calyx, etc., are characters which, though subject to variation, have been taken as ground for creating several varieties. The constancy of these it is difficult to prove on account of the scarcity of adequate specimens in most herbaria.

The specimens which I have investigated do not quite agree with the description of Pierre's genus *Calocarpum* in Urban.¹ Thus, among 15 flowers from 4 distinct

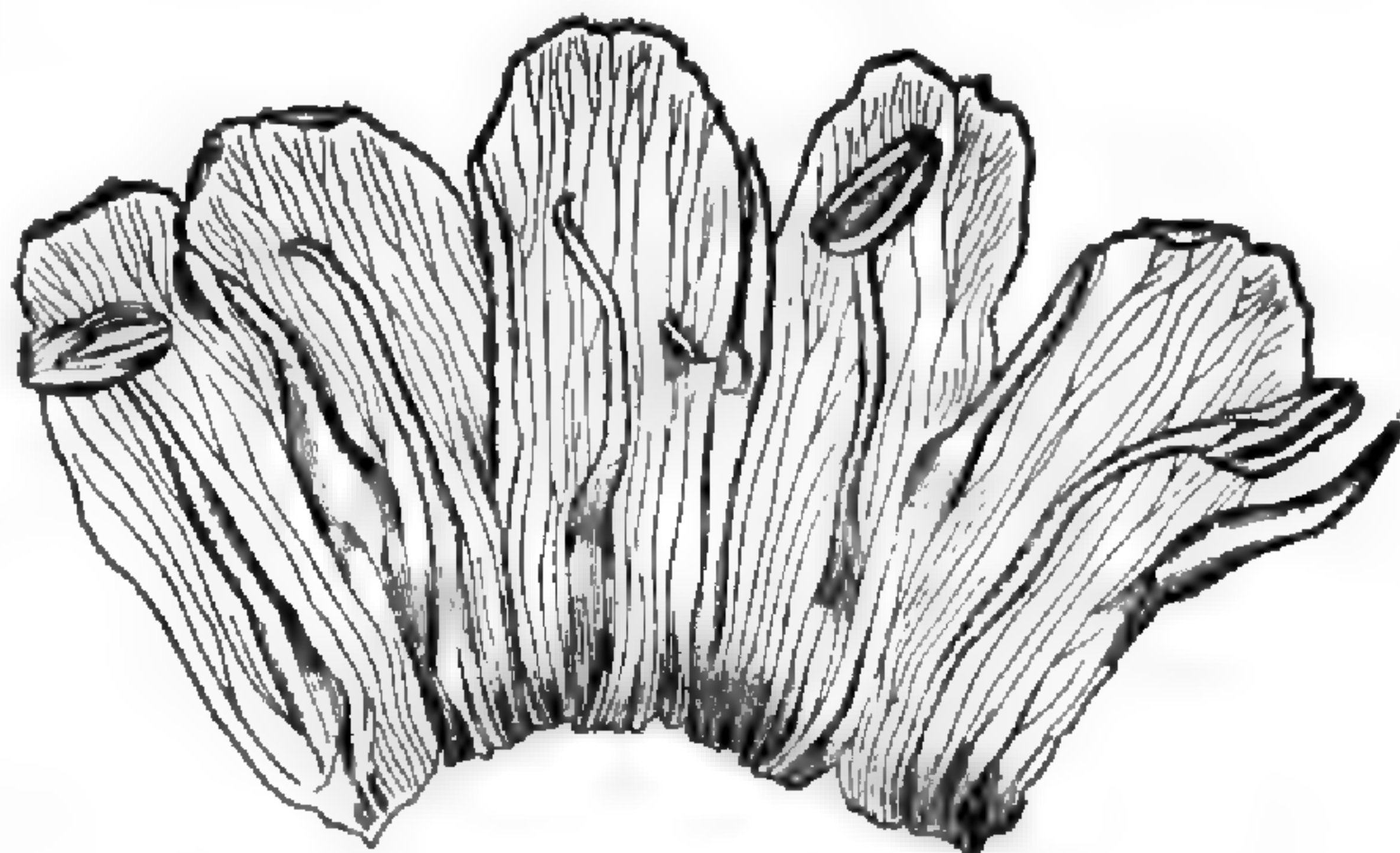
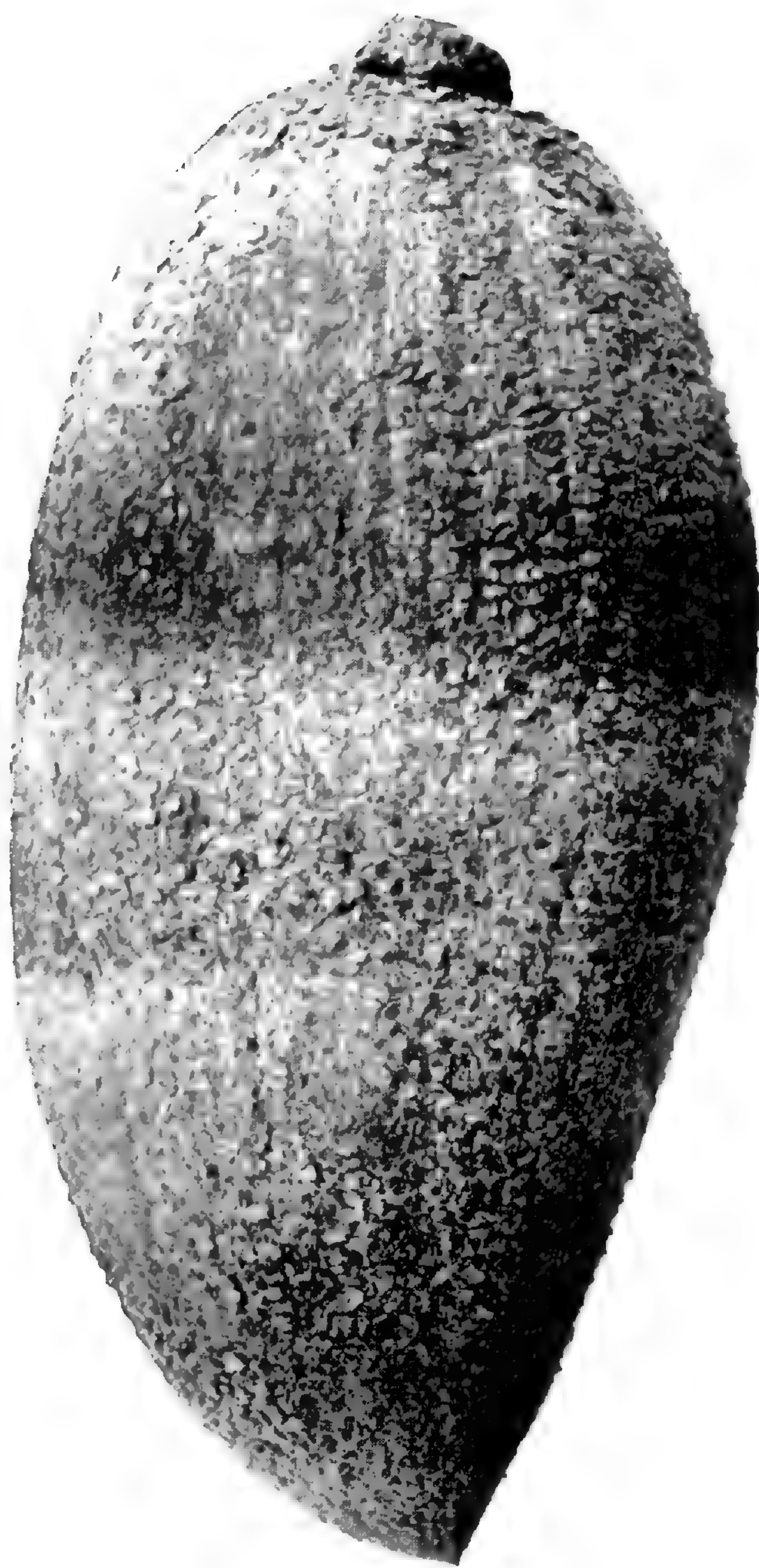


FIG. 84.—Spread corolla of *Calocarpum mammosum* with stamens and staminodes. Scale 3.

¹ Symb. Antill. 5: 97. 1904.



FRUIT OF *CALOCARPUM MAMMOSUM* (L.) PIERRE.



FRUIT OF *CALOCARPUM MAMMOSUM* (L.) PIERRE.

localities in Central America and the West Indies, 9 were found to have 9 sepals, while 4 had 10 and 2 only 8. The normal number seems to be 9, though Pierre gives 4 to 7 such divisions. The stamens were found to be generally inserted a little lower than the staminodes, indicating that they belong to the inner whorl of the androecium. The stigma is seldom distinctly or even obscurely radiate, the style ending simply in an obtuse point.

Has *Calocarpum mammosum* ever been found in a truly wild state by botanical collectors? It is one of the principal fruit trees in its area and as such belongs rather to the class of semicultivated plants, like *Bixa orellana*, *Mammea americana*, *Persea gratissima*, *Crescentia cujete*, and others. De la Maza¹ indicates it as cultivated in Cuba, and Cook and Collins² say it is rare in Porto Rico. While the product of the cacao tree was highly prized by the Mexicans and constituted the usual beverage among the nobility, Peschel³ reports that the peoples of Central America, among them principally the Chorotegas, gave the preference to the zapote, which was generally cultivated for a similar use. And again, Juarros⁴ informs us that the *sapuyul*, or kernel of the zapote seed, was one of the main exchange products of the people of Suchiltepequez, in Guatemala, at the end of the eighteenth century. According to Mr. G. N. Collins⁵ the peeled kernels of the same seeds are still offered for sale in the markets of the Isthmus of Tehuantepec. In Nicaragua, Costa Rica, and Panama the zapote tree is often met with in the forests, in isolated specimens, but almost always in places that are known to have been formerly inhabited by man.

Notwithstanding the lack of evidence as to the existence of *Calocarpum mammosum* in the wild condition, it seems that it must be considered a native of Central America. The showy appearance and cleanliness of the seeds may have helped in some wise in the dissemination of the tree. In Santa Marta (Colombia) I have seen them carried as a curiosity by the Indians of the mountains, who did not seem to know the tree and had no name for it, although they readily assimilated it to their own "manzana" (*Lucuma argoacoensis* Karst.).

The reddish zapote wood is said by Grosourdy⁶ to be fine-grained, compact, hard, and apparently suitable for cabinetwork. The supply, however, would always be very limited, as the tree is rather protected by the natives on account of the fruit. Besides, it usually forks very low, so that trunks of any good length are seldom available.

The fruit has a thick, juicy mesocarp, of a reddish or pinkish color, and a little sticky on account of the latex it contains. The flavor is sweetish, with a peculiar squashy strain, quite delectable if we believe some Spanish authors, but not generally to the taste of foreigners. This strain might, however, be removed or improved by

¹ Gomez de la Maza, Manuel. *Nociones de Botánica sistemática*. 76. 1893.

² Contr. U. S. Nat. Herb. 8: 178. 1903.

³ Peschel, Oscar. *Geschichte des Zeitalters der Entdeckungen* 513. 1858. The Sapota Äpfel here referred to are the fruit of *Achras zapota*.

⁴ Juarros, Domingo. *Historia de la ciudad de Guatemala*, edición del Museo guatemalteco 23. 1857. As the note here referred to is a very interesting addition to the economic history of the zapote tree, it is well to reproduce it in whole:

"*Sapuyul* es la almendra del zapote, fruta como de medio pié de largo: la almendra tiene de dos á tres pulgadas: se halla dentro de una cáscara, como la de la avellana; sobre ella hay una médula de color encarnado, tan hermosa á la vista como deleitosa al gusto, y encima de esta una corteza un poco dura. Los Indios y gente pobre se sirven del sapuyul para hacer chocolate, mezclándolo con cacao: es tanta la abundancia de zapotes en esta provincia, que botan la fruta, por cojer el sapuyul, y éste tiene tal consumo, que solo en la plaza de Quezaltenango se venden de cuatro á cinco mil pesos de dicha almendra al año."

⁵ Manuscript notes.

⁶ Grosourdy, René de, M. D. *El Médico botánico criollo* 2: 398. 1864.

appropriate selection and culture. That same mesocarp can also be turned into an excellent marmalade, or into jelly, and although the fruit does not yet seem to have met with any great favor in our markets, it is not altogether without importance among tropical fruits.

The seed contains a large, oily almond, which has a strong smell and a bitter taste. According to de la Maza¹ it has stupefying properties. Grosourdy calls it a diuretic, and in Costa Rica the oil is used in the treatment of persistent catarrhal complaints, while the whole almond, finely ground, is made into an exquisite confection.² Moreover, as seen above, it seems to have been extensively used, and is still used on a small scale, in conjunction with cacao, in the preparation of the current beverage of the natives of Central America. It is called "sapuyul" (Nahuatl *tzap-ullul*, i. e., zapote resin or gum?). According to Mr. G. N. Collins (MS. notes), the Kekchi Indians of Verapaz still use it in the preparation of a drink, in conjunction with cacao and parched corn; it imparts a bitter taste to the beverage. These Indians gather all the seeds they find along the trail; the almonds are first boiled, then roasted and grated. As a historical memorandum, we may also mention that during the first half of the nineteenth century the same seed was still used in Costa Rica in lieu of the present iron to smooth starched white linen.³

EXPLANATION OF PLATES 48-51.—All from photographs taken by G. N. Collins in Guatemala, except 49, A; this taken by C. B. Doyle in Washington. Seeds and fruits natural size.

Calocarpum viride Pittier, sp. nov.

PLATES 52-54. FIGURES 85, 86.

A tree similar in appearance to *C. mammosum*; branchlets erect, thick, glabrous, or subglabrous and shaggy-verrucose on older growth, densely ferruginous on the newest parts.

Leaves petiolate, densely clustered at the ends of the floriferous branchlets, scattered and irregularly alternate along the sterile shoots. Petioles 2 cm. long, rather thick, broader at the base, subcanaliculate, grayish or ferruginose-tomentose. Leaf blades 10 to 25 cm. long, 5 to 7 cm. broad, usually oblanceolate but sometimes rounded at the tip, long-cuneate or cuneate-rounded at the base, glabrous above, except on the main nerve, here more or less hairy, white and filmy-tomentose beneath; margin entire or obscurely sinuate; nervation impressed above, prominent beneath; primary veins 15 to 21 on each side.



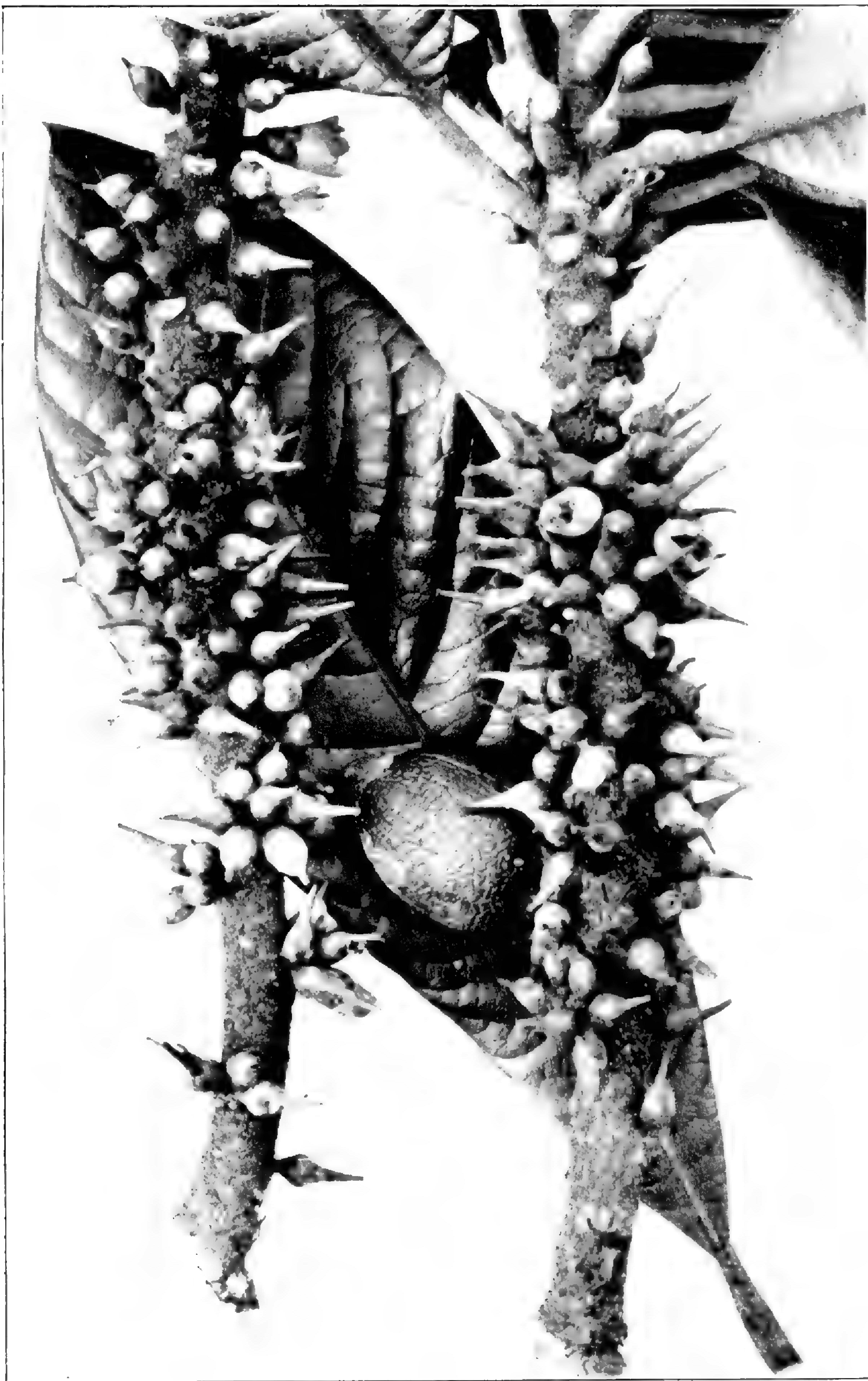
FIG. 85.—Part of corolla of *Calocarpum viride* with stamens and staminodes. Scale 3.

Flowers short-pedicellate, in numerous glomerules of 2 to 5 in the defoliated axils, or single or geminate in the axils of the lower leaves. Pedicels 1 to 3 mm. long, ferruginose-tomentose. Sepals 9 (sometimes 10), imbricate, more or less rounded, subapiculate, 2 to 4 mm. long and broad, the exterior ones smaller, thicker, and densely hairy, the interior ones larger, moderately hairy except on the right margin, covered in the imbrication. Corolla 10 mm. long, pinkish or sallow white, the broad tube pubescent, about 5 mm. long; lobes about 5 mm. long, broadly ovate-rounded, silky on the back and very shortly ciliate on the margin. Staminodes pubescent, 2.5 mm. long, rather broad, contracted or attenuate at the tip. Stamens glabrous; filaments 2.5 mm. long, subulate; anthers ovate, with the connective more prominent than in *C. mammosum*. Pistil clavate, 7 to 9 mm. long; ovary ovoid, covered, together with the base of the style, with stiff brownish hairs; style obscurely 5-sulcate and slightly thickened at the apex, which is often distinctly 5-lobulate.

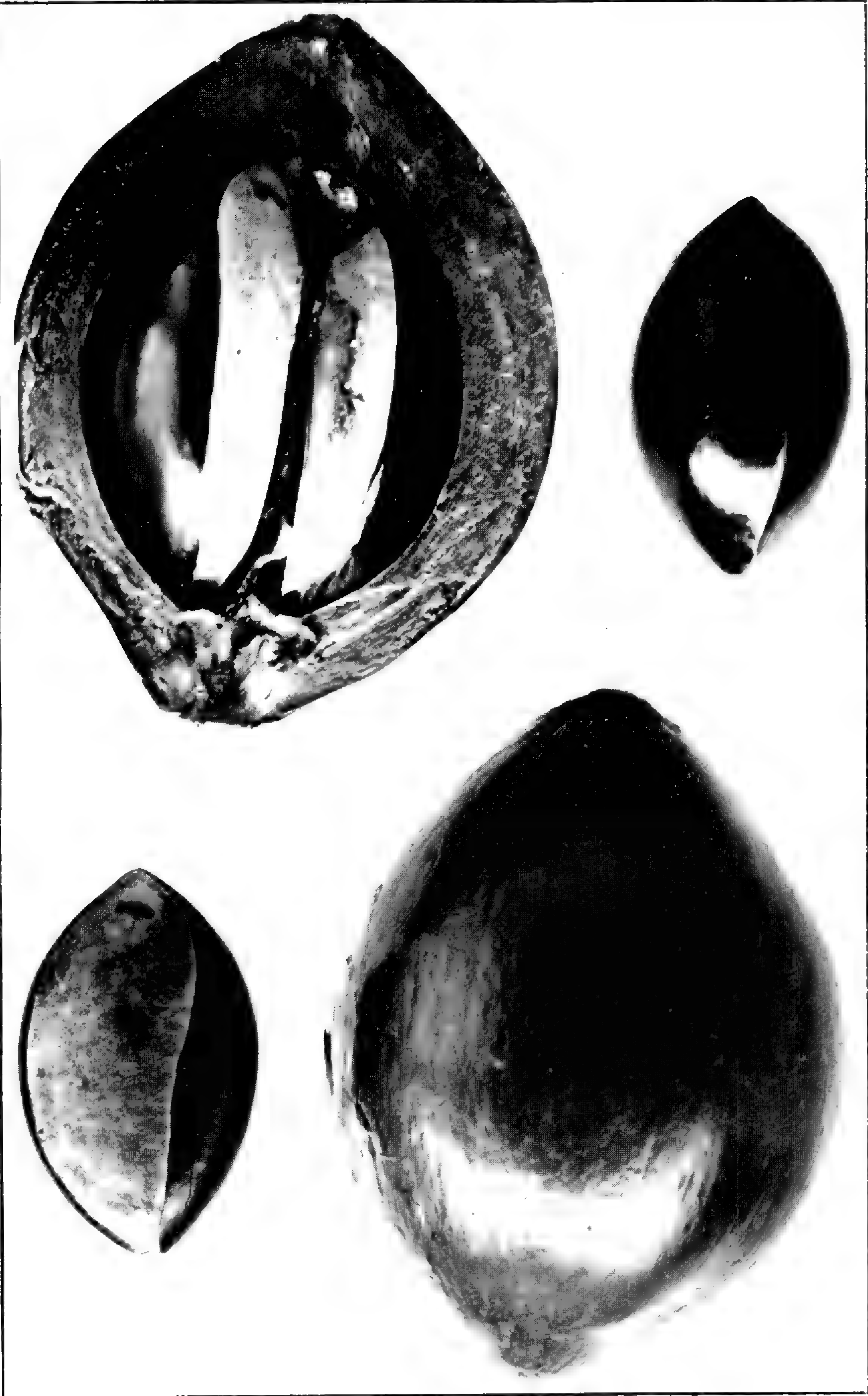
¹ Nociones de Botánica Sistemática 76. 1893.

² Pittier, H. Plantas usuales de Costa Rica. 141. 1908.

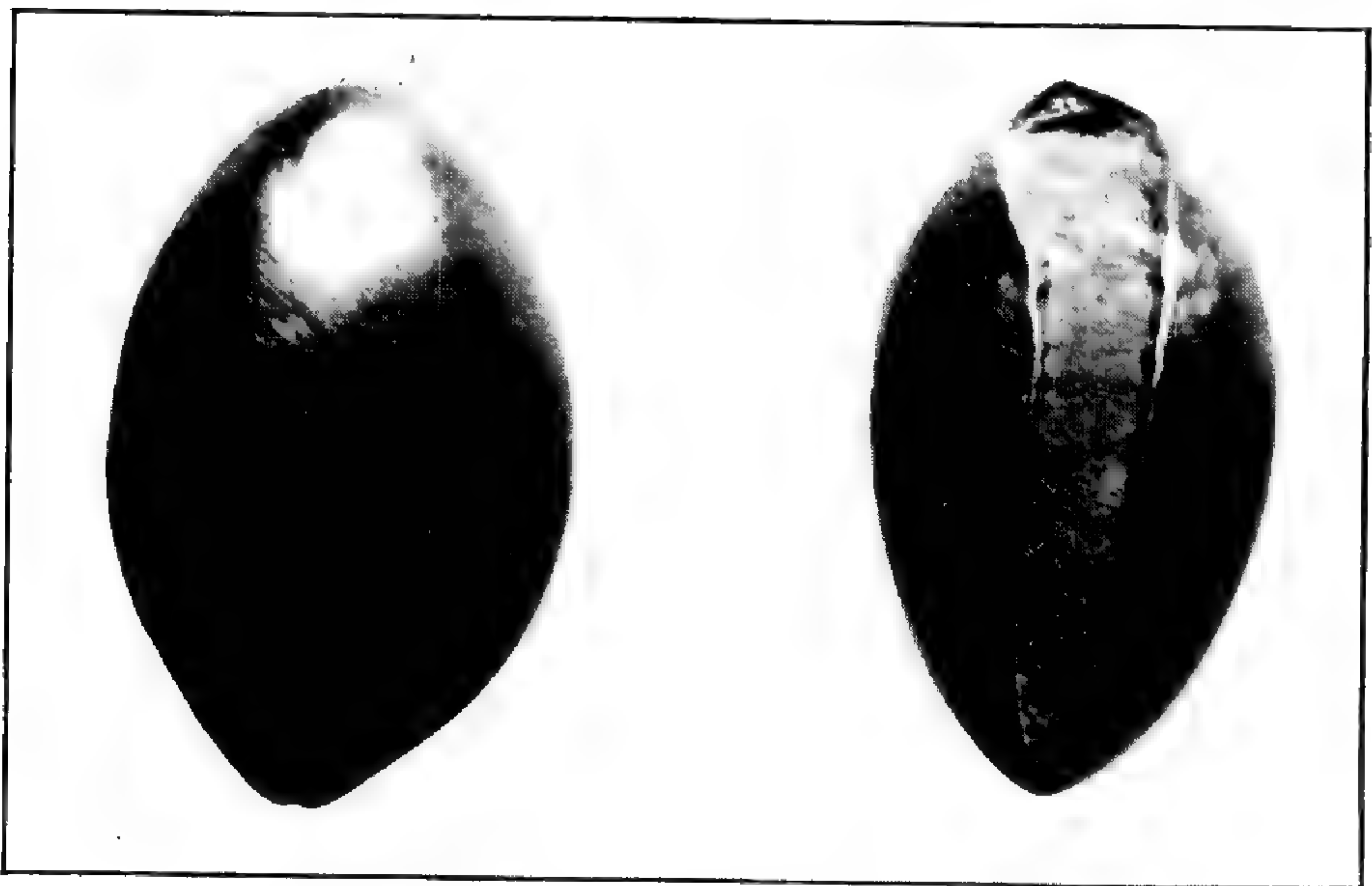
³ Pittier, loc. cit.



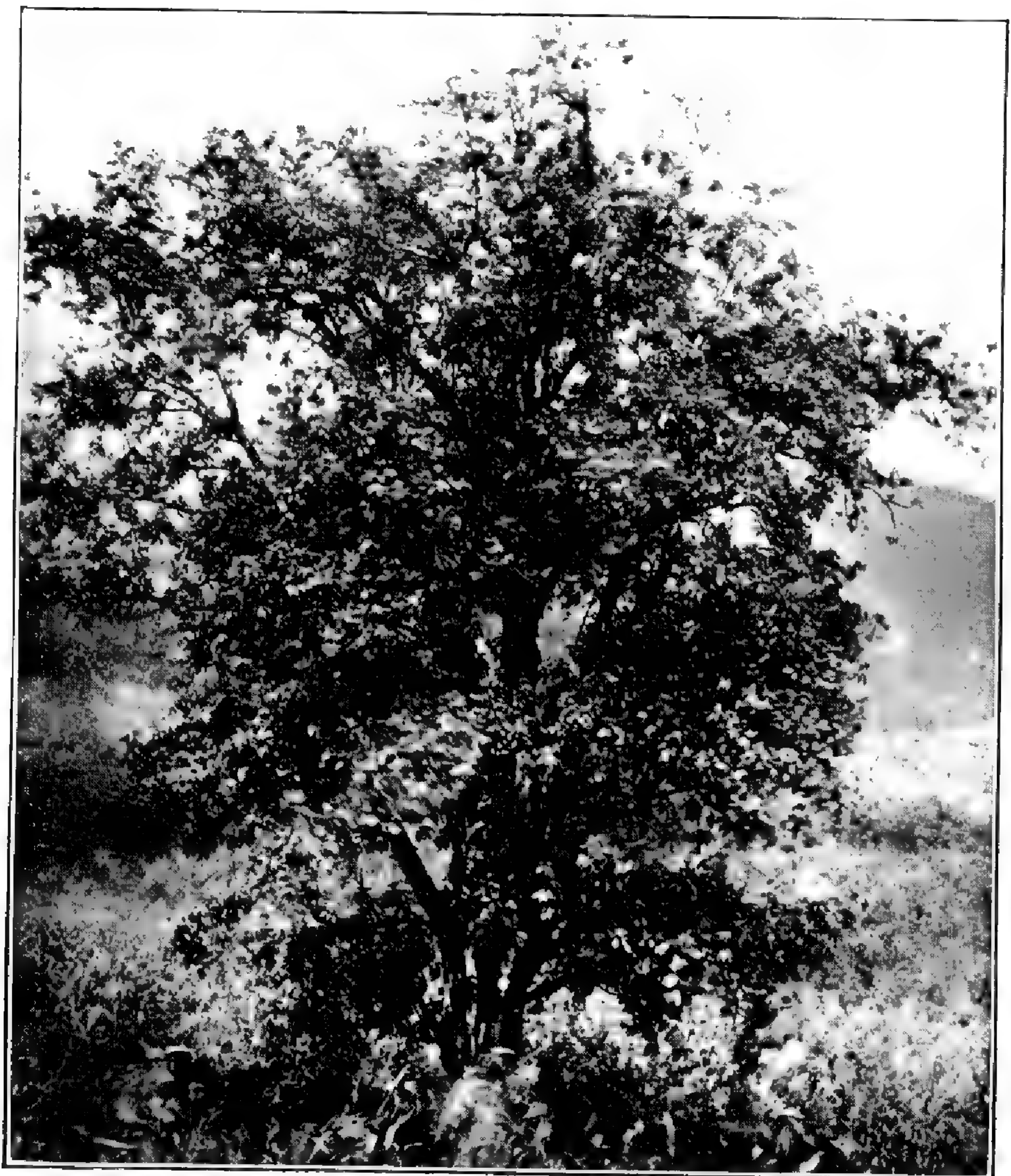
CALOCARPUM VIRIDE PITTIER.



FRUIT AND SEEDS OF CALOCARPUM VIRIDE PITTIER.



A. SEEDS OF *CALOCARPUM VIRIDE* PITTIER.



B. *CALOCARPUM VIRIDE* PITTIER.

Fruit varying from subglobose to ovoid, always pointed at the apex, and sometimes also at the base, 9 to 10 cm. long, 6.5 to 8 cm. in diameter, 1 or 2-seeded; skin thin, smooth, olive green, more or less covered with russet dots or lines. Seeds 4.5 to 6 cm. long, 2.3 to 3.7 cm. in diameter, olive-shaped, pointed at both ends, apiculate near the hilum end of the umbilical area, distinctly carinate, light brown and polished; umbilical area obovate-elongate, broader at the hilum, reddish and almost smooth.

Type in the U. S. National Herbarium, no. 860323, collected at Cobán, Alta Verapaz, Guatemala, August 6, 1910, by O. F. Cook (no. 214). Besides the type sheet there is a second sheet in the National Herbarium of the same collection, and another from near the Finca Sepacuité, Alta Verapaz, March 26, 1902, *Cook & Griggs* 183, with a photograph (no. 184).

COMMON NAMES: Guatemala, *ingerto*. Costa Rica, *zapote*. Honduras, *zapotillo calenturiente*.

This species, which curiously enough seems to have hitherto escaped the attention of botanists, is closely related to *Achras mammosa*, differing, nevertheless, by the smaller leaves, downy and white beneath, the smaller and differently shaped sepals, the shorter staminodes and stamens, the latter with broadly ovate anthers, and above all the comparatively small, green, and thin-skinned fruit and the smaller, ovate seed. Morelet¹ calls it *Lucuma salicifolia*, but there can be no possible confusion with that Mexican species of Humboldt and Bonpland.

Calocarpum viride is known so far only from Guatemala (where it seems to be rather frequent in Alta Verapaz), from Honduras, and from Costa Rica. It is likely to be found in all the intervening region. The common name "ingerto" suggests some kind of crossing, or the result of budding, but there can be no doubt as to the tree being a good representative of the genus *Calocarpum*.

The fruit is superior in quality to the common zapote, the flesh not being so fibrous and being free from the squashy flavor that characterizes the latter. It seems to keep pretty well and the skin, although thin, is not easily broken in transportation. The *ingerto* is often seen in the markets of Guatemalan towns and seems to be a favorite with the people; it is rarer in Costa Rica.

EXPLANATION OF PLATES 52-54.—All from photographs taken by G. N. Collins in Guatemala, except 54, A; this from one taken in Washington by C. B. Doyle. All natural size, except 54, B.

Lucuma salicifolia H. B. K. Nov. Gen. & Sp. 3: 241. 1818.

PLATES 55, 56. FIGURE 87.

Richardella salicifolia Pierre, Notes Bot. Sapot. 20. 1890.

Section Rivicoa. A small tree, about 8 meters high and 25 cm. in diameter (R. S. Williams in sched.). Young twigs sparsely pubescent.

Leaves alternate, crowded at the ends of the branchlets, petiolate, entire, perfectly glabrous. Petioles 1 to 1.5 cm. long, broadly canaliculate. Leaf blades 9 to 18 cm. long, 3 to 4 cm. broad, lanceolate, acute at the base, narrowing into an obtuse tip, light green above, paler beneath. Margin slightly revolute. Nervation distinct on both faces, more salient beneath, 14 to 15 primary veins on each side of the costa.

Flowers green (Williams) or white, solitary or geminate in the axils of the leaves. Pedicels 9 to 12 mm. long, pubescent. Sepals 5, 5 to 6 mm. long, free, ovate, coria-

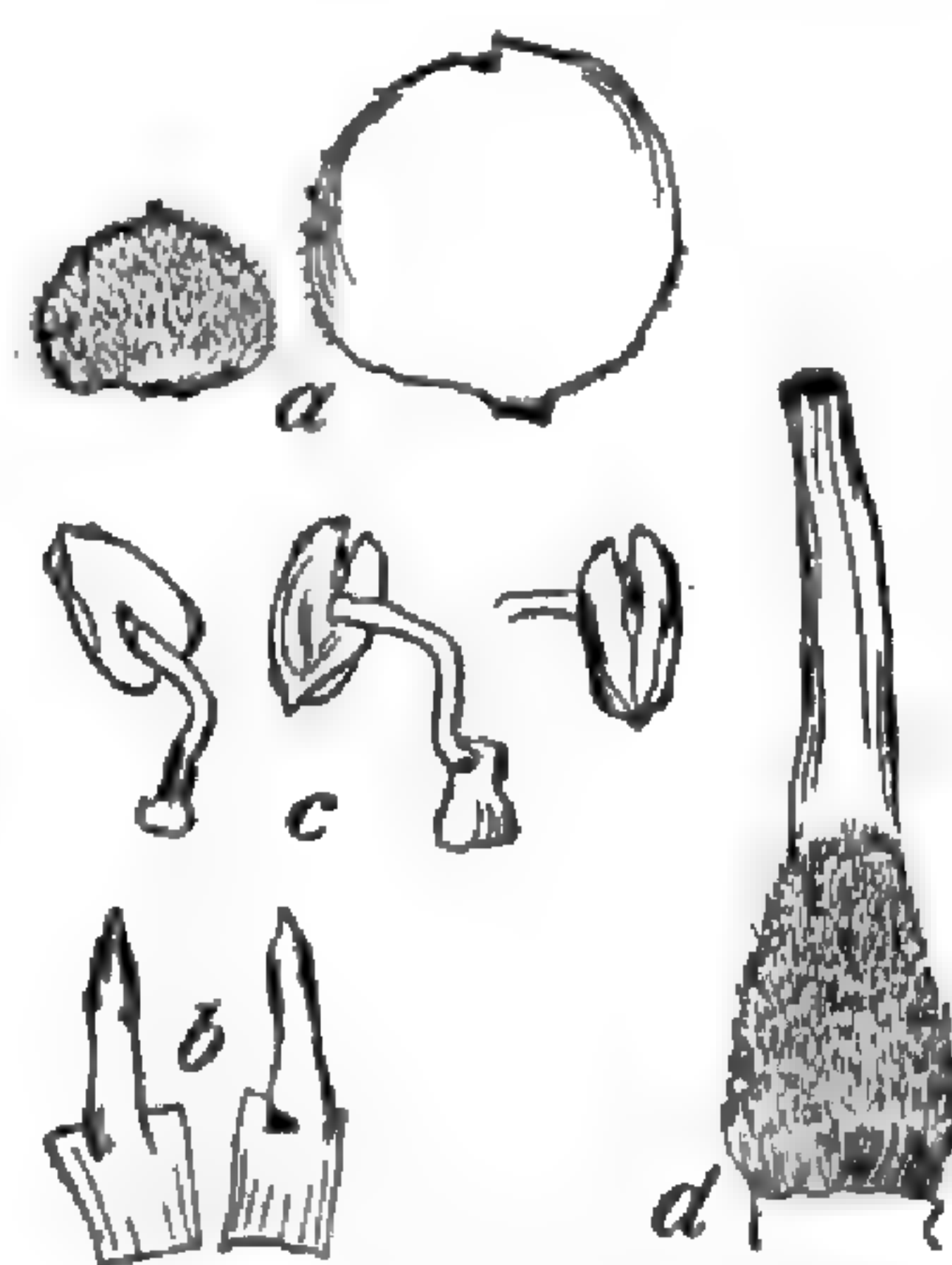


FIG. 86.—Floral details of *Calocarpum viride*. a, Sepals, exterior and interior; b, staminodes; c, stamens; d, pistil. All scale 3.

¹ Morelet, P. M. A. Voyage dans l'Amérique centrale, l'Ile de Cuba et le Yucatan 2: 152. 1858-75.

ceous, velvety outside, glabrous inside. Corolla broad, 10 to 11 mm. long, 5 or 6 lobed, pubescent outside, the margins minutely ciliate or denticulate; lobes ovate, equal in length to the tube, rounded at the tip. Staminodes 5, 3.5 to 4 mm. long, papillose, linear, rounded-obtuse at the end, alternating with and one-third shorter than the corolla lobes. Stamens 5, 2 to 3.5 mm. long, glabrous, inserted a little lower than the staminodes; filaments short, attenuate at tip; anthers extrorse, ovate or ovate-elliptic, slightly emarginate at base. Pistil about 10 mm. long; ovary rounded, 6-celled, densely hairy; style smooth; stigma obtuse, hardly distinct from the style.

Fruits fusiform, 1-seeded, 10 to 12 cm. long, 4 to 5 cm. in diameter, rounded at base with the persistent, 5-parted calyx attached, attenuate and rounded-obtuse at the tip (and often with a lateral stigmatic spot). Skin thick, leathery, smooth, yellow; pulp mealy, sweet, edible, the color and consistence of the yolk of a hard-boiled egg. Seed fusiform, 4 to 5 cm. long, 1.5 to 2 cm. in diameter, apiculate at the hilum end, light brown and polished outside the umbilical area, this broad, elliptic-elongate, neither impressed nor salient, whitish and almost smooth.

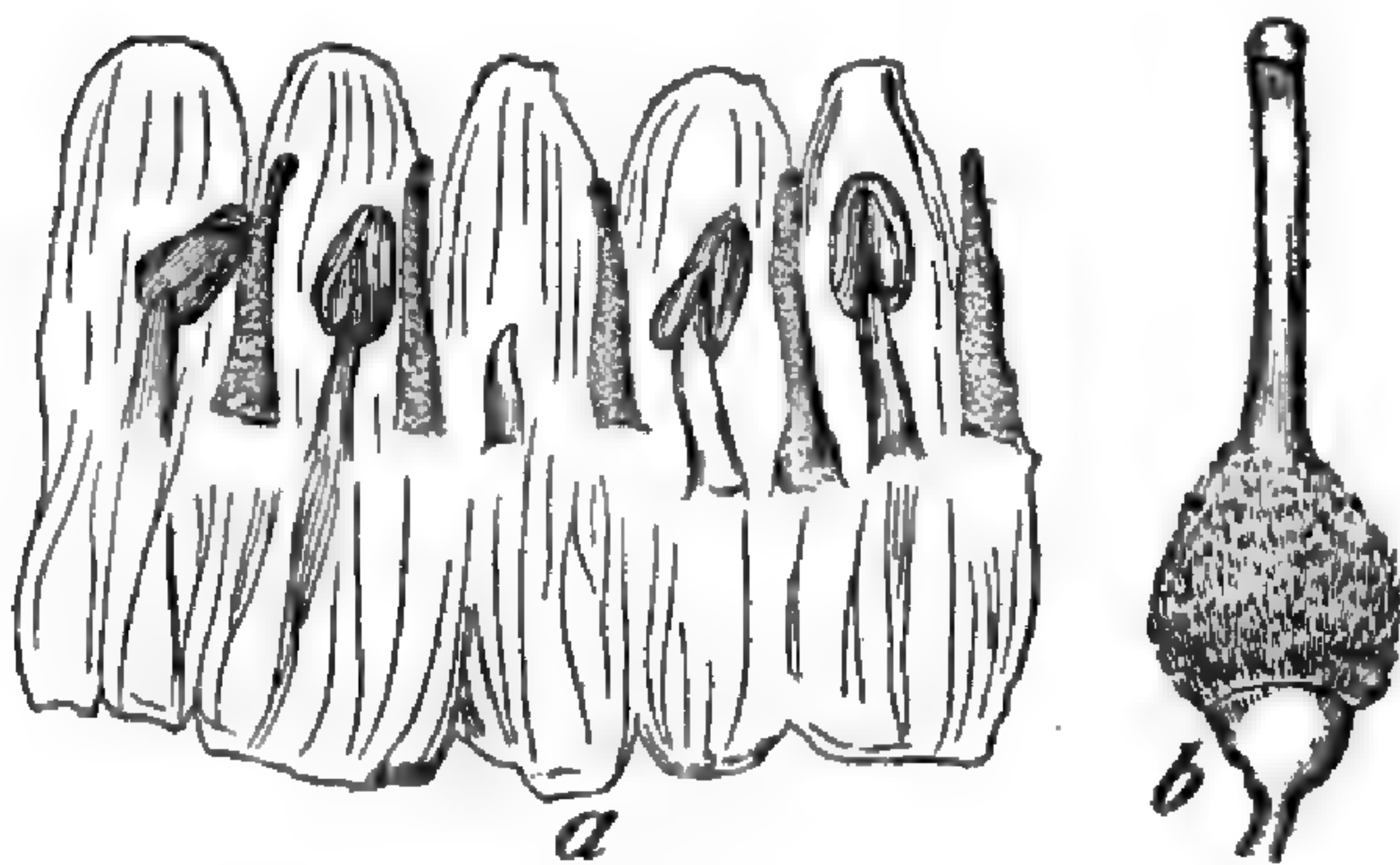


FIG. 87.—Floral details of *Lucuma salicifolia*. *a*, Opened corolla with stamens and staminodes; *b*, pistil. Scale 3.

Description based on the fine Costa Rican specimens sent by Mr. O. Jiménez Luthmer (no. 513).

MEXICO: The species was originally described from this country upon specimens or notes obtained from Cervantes by Bonpland. The fruit and seed are described and figured here probably for the first time. Safford (MSS. notes) reports it from Mexico City, Guanajuato, Oaxaca, Morelos, Guadalajara, and Michoacan. It is doubtful whether *L. palmeri* Fernald, a scrubby form collected in Acapulco, is really distinct.

COSTA RICA: Occasionally cultivated in the valley of San José, but never met with in a wild condition.

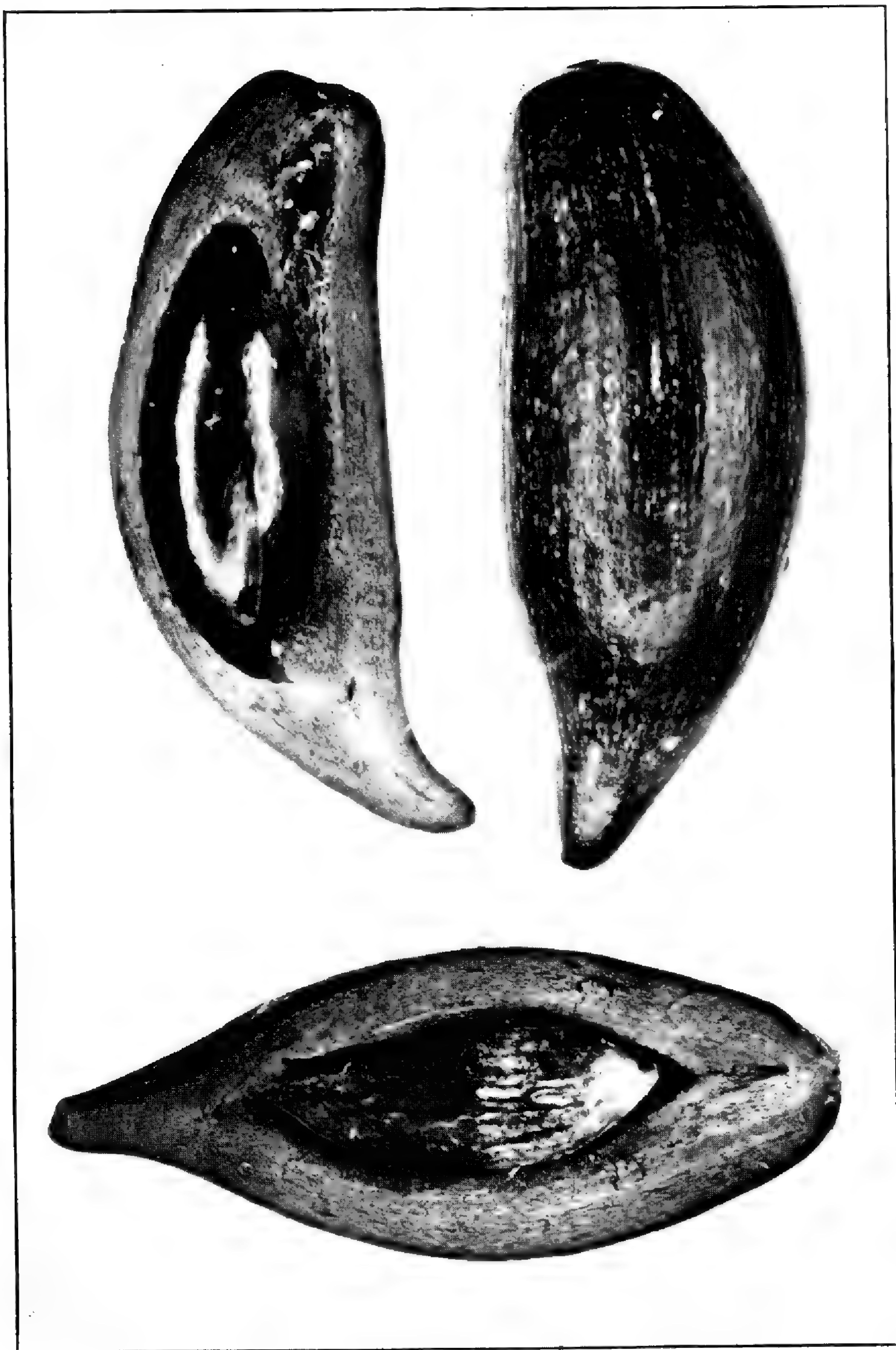
PANAMA: Vicinity of Penonomé, Province of Coclé, in the zone below 300 meters, flowers, between February 23 and March 22, 1908, *R. S. Williams* 56 (U. S. National Herbarium, no. 677891).

There is no indication as to the presence or absence of the species in the northern and middle part of Central America, but it is very likely to be met with in that intervening region.

COMMON NAMES: Mexico—Central Mexico and Guanajuato, *zapote borracho*; Oaxaca and Morelos, *zapote amarillo*; Guadalajara, *mamey de Cartagena*; Michoacan, *huicumo* (Safford). Costa Rica, *zapotillo*, *siguapa*, and *canistel*, the latter probably from “*canisté*,” the Maya name for *Lucuma multiflora*.

This species seems to vary as to pubescence, number and disposition of flowers, etc., the only really constant characters being those shown by the fruit and seed. In the absence of these it is likely that several forms of *L. salicifolia* have been described as distinct species.

EXPLANATION OF PLATES 55, 56.—From photographs taken by C. B. Doyle of alcoholic material from Costa Rica.



FRUITS OF *LUCUMA SALICIFOLIA* H. B. K.



SEEDS OF LUCUMA SALICIFOLIA H. B. K.

INDEX.

[Page numbers of principal entries in boldface type. Synonyms in italics.]

	Page.		Page.
<i>Achradelpha</i>	77	Mamey colorado.....	82
<i>mammosa</i>	81	de Cartagena.....	86
Achras.....	76	zapote.....	82
<i>mammosa</i>	85	Mammea americana.....	78, 83
<i>sapota</i>	78	Mammee.....	78
zapota.....	76, 78, 83	Mammee-sapote.....	82
<i>zapotilla</i>	78	Manzana.....	83
Alga.....	77	Marmalade fruit.....	82
Bixa orellana.....	83	Mespilus germanica.....	78
Bko.....	82	Mispelboom.....	79
Breiafelbaum.....	79	Muy.....	79
Brosimum alicastrum.....	70	Muyozapot.....	79
<i>costaricanum</i>	69	Naseberry.....	81
<i>terrabanum</i>	69	tree.....	79
Cacao tree.....	83	Nispero.....	76, 78, 79
Callicarpa.....	77	de monte.....	80
Calocarpum.....	76, 77, 82, 85	quitense.....	79
<i>mammosum</i>	77, 78, 81, 83, 84	Oa-bo.....	82
<i>sapota</i>	77	Persea gratissima.....	83
<i>viride</i>	84, 85	<i>Richardella salicifolia</i>	85
<i>Calospermum</i>	76, 77	Rubber plantation.....	70
<i>mammosum</i>	81	rubber, scrap.....	71
Canisté.....	86	tree.....	70, 72
Canistel.....	86	Sal-tul.....	82
Chacal haaz.....	82	Sapium biglandulosum.....	74
Chicle.....	81	<i>hemsleyanum</i>	73, 75
gum.....	79	hippomane.....	73, 75
Chico.....	79	<i>obtusilobum</i>	73, 74, 75
Chicozapote.....	76, 78, 79	<i>thomsoni</i>	72
Chul.....	82	tolimense.....	72
Chul-ul.....	82	utile.....	74, 75
Crescentia cujete.....	83	verum.....	70, 71, 72
Donatia.....	77, 77	Sapodilla.....	76, 78, 81
Euphorbiaceae.....	69	tree.....	79, 80, 81
Flú.....	82	wood.....	81
Grosse zapotte.....	82	<i>Sapota achras</i>	78
Gum zapote.....	78	<i>zapotilla</i>	76, 78
Haaz.....	82	Sapotaceae.....	69
Hokkoes.....	81	Sapote.....	82
Huicumo.....	86	Sapotillier.....	79
Ibán.....	79	Sapuyul.....	83, 84
Ingerto.....	85	Scrap rubber.....	71
Kóm-kra.....	82	Sideroxylum.....	76
Korób.....	79	<i>sapota</i>	77, 81
Kurók.....	82	Siguapa.....	86
Lucuma.....	76	Spondias dulcis.....	76
<i>argoacoensis</i>	83	<i>lutea</i>	76
<i>bonplandia</i>	81	<i>nigrescens</i>	75
<i>mammosa</i>	81	<i>purpurea</i>	76
<i>multiflora</i>	86	Tsapas sabani.....	82
<i>palmeri</i>	86	Tul-ul.....	82
<i>salicifolia</i>	85, 86	Turkeys, wild.....	81
Mamey.....	82	Tzapotl.....	78, 82
		Tzap-ullul.....	84
		Tzicozapotl.....	78, 79

	Page.		Page.
<i>Vuelleria</i>	76	Zapote mamey	82
<i>mammosa</i>	81	resin.....	84
Wild turkeys.....	81	seed.....	83
Ya.....	79	tree.....	77, 83
Zapote.....	77, 78, 79, 82, 83, 85	wood.....	83
amarillo.....	86	Zapotillo.....	78, 86
borracho.....	86	calenturiente.....	85
chico.....	76, 78, 79	Zapotte.....	82
grande.....	78	à crème.....	82
gum.....	84	, grosse.....	82
, gum.....	78		



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FROM THE

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PHANEROGAMS—No. 2

By PAUL C. STANDLEY



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II

PREFACE.

There is presented herewith a second installment of studies by Mr. Paul C. Standley, of the United States National Herbarium, upon the flowering plants of tropical America. The new species described and the changes of nomenclature proposed are largely the result of work upon certain groups, chiefly Rubiaceae, Malvaceae, and Leguminosae, as represented in the extensive collections obtained recently in Panama during the progress of the Smithsonian Biological Survey of the Panama Canal Zone. A large part of the paper consists of descriptions and nomenclatorial changes in the Amaranthaceae and Allioniaceae incidental to monographic work upon these families. Two new genera are proposed in the Malvaceae.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

CONTENTS.

	Page.
Introduction.....	87
New Cyperaceae from Panama.....	87
New Amaranthaceae from tropical North America.....	88
New or notable Allioniaceae.....	98
New Caesalpiniaceae from Panama.....	102
New or notable Mimosaceae from Panama	104
New Panamanian Fabaceae.....	106
New or notable species of Geranium from Colombia and Venezuela	110
Wercklea, a new genus of Malvaceae.....	111
Peltaea, a new genus of Malvaceae.....	113
The genus Lopimia.....	114
Four new species of Malache from Panama and Costa Rica.....	115
A new Waltheria from Colombia.....	117
New or notable Ebenaceae from Mexico.....	118
A new Styrax from Panama.....	121
Tardavel a valid generic name to replace Borreria.....	122
Restoration of the generic name Evea, with descriptions of two new species...	123
Duggena an older name than Gonzalagunia.....	124
New or notable species of Arcytophyllum.....	126
New species of Psychotria from Panama.....	128
New species of Rubiaceae of several genera, chiefly from Panama.....	133
Index	vii

STUDIES OF TROPICAL AMERICAN PHANEROGAMS— NO. 2.

By PAUL C. STANDLEY.

INTRODUCTION.

The present paper is in continuation of a series begun in 1914.¹ It contains descriptions of new species and taxonomic notes upon various groups of plants, but chiefly the Amaranthaceae, Allioniaceae, Malvaceae, and Rubiaceae, and the group of families formerly known as the Leguminosae. There are included descriptions of two new genera in the Malvaceae.

The new species described are based chiefly upon the extensive collections obtained in Panama by Mr. H. Pittier. Study of the Panama collections shows very clearly the close alliance of the flora of the Isthmus with that of Colombia, as was to be expected. Quite unforeseen, however, is its inclusion of certain genera which are characteristically Brazilian, a fact recently pointed out by Mr. Pittier.² Two Brazilian genera, *Cassupa* and *Stachyarrhena*, are here reported for the first time from North America. Moreover, several of the species described as new have their closest allies in Brazilian plants.

NEW CYPERACEAE FROM PANAMA.

While working with the Cyperaceae of Panama, the writer discovered two apparently undescribed species, a *Rynchospora* and a *Scleria*, descriptions of which are published below. The *Rynchospora* is particularly interesting, being very unlike any species previously reported from North America.

There are also included new combinations in *Cyperus*, *Stenophyllus*, and *Calyptracarya*, which are necessary for properly listing the Panama Cyperaceae.

***Rynchospora argentea* Standley, sp. nov.**

Tufted perennial; leaves 30 to 40 cm. long, 2 to 3 cm. wide, acuminate, narrowed at the base into broadly winged petioles, prominently nerved, scabrous on the margins, elsewhere glabrous, silvery white, especially on the upper surface, at least when dry;

¹ Contr. U. S. Nat. Herb. 17: 427-458. pls. 24-31. 1914.

² Journ. Washington Acad. Sci. 5: 468-469. 1915.

inflorescence 20 cm. long or less, much shorter than the leaves, nearly naked, bearing only 1 or 2 much reduced thin pale leaves, paniculate but only sparingly branched, the branches angled, glabrous; spikelets solitary, on peduncles 1.5 to 3 mm. long; empty scales several, nearly white, hyaline, lanceolate or oblong, acute, with short subulate tips, glabrous except for the scaberulous midnerve; bristles of the involucre 6, white, scaberulous; style branches very short; fruit not seen.

Type in the U. S. National Herbarium, no. 679431, collected on high hills back of Puerto Obaldía, on the San Blas Coast, Panama, August, 1911, by H. Pittier (no. 4307).

In general appearance this is very unlike any other species of which material or descriptions have been seen. Its broad, elongated, silvery leaves and the very short inflorescence, nearly leafless and bearing but few spikelets, will enable one to recognize it readily.

***Scleria hitchcockii* Standley, sp. nov.**

Underground parts not seen; plants slender, about 70 cm. high, rather sparingly leafy; culms triquetrous, sharply angled, striate, yellowish green, obscurely scaberulous; sheaths closely investing the culms and nearly covering them, 3 to 5 cm. long, sharply angled, striate, glabrous, or hirsutulous near the summit; ligule very short, about 1 mm. long, truncate, hirsute; leaf blades 12 to 18 cm. long, narrow, 2 to 4 mm. wide, yellowish green, acute, conspicuously nerved, nearly glabrous, but often hirsute-ciliate on the margins and on the midvein beneath; inflorescence much exserted, on a slender peduncle; panicle about 11 cm. long, composed of few very slender spikes, the branches short-ciliate on the angles; bract subtending the inflorescence 3.5 cm. long, very narrow; spikelets in sessile fascicles of 2, each consisting of one fertile and one sterile flower; glumes of the fertile flower about 2 mm. long, reddish brown, ovate, oblong-ovate, or lanceolate, thin, strongly keeled, the midnerve extended as a short awn; glumes of the sterile flowers slightly longer, about 3 mm. long, narrower; achenes smooth and shining, white, spherical or depressed, 1.2 mm. in diameter, disk fused with the achenes as a short thick stipe.

Type in the U. S. National Herbarium, no. 678393, collected on a grassy hillside in the foothills near El Boquete, Province of Chiriquí, Panama, altitude 1,000 to 1,300 meters, September 28 to October 7, 1911, by A. S. Hitchcock (no. 8326).

The proposed species is related to *Scleria lithosperma*, but differs conspicuously in the slender branches, short scales of the flowers, and small, depressed achenes.

***Calyptracarya glomerulata* (Brongn.) Standley.**

Becquerelia glomerulata Brongn. in Duperrey, Bot. Voy. Coquille 2: 163. 1829.

Calyptracarya fragifera Kunth, Enum. Pl. 2: 364. 1837.

Tropical America.

***Cyperus hermaphroditus* (Jacq.) Standley.**

Carex hermaphrodita Jacq. Coll. Bot. 4: 174. 1790.

Mariscus jacquinii H. B. K. Nov. Gen. & Sp. 1: 216. 1815.

West Indies and Mexico to Argentina.

***Stenophyllus paradoxus* (Spreng.) Standley.**

Schoenus paradoxus Spreng. Syst. Veg. 1: 190. 1825.

Bulbostylis paradoxa Kunth, Enum. Pl. 2: 206. 1837.

Central America and tropical South America.

NEW AMARANTHACEAE FROM TROPICAL NORTH AMERICA.

Recently the writer has been engaged in monographing the family Amaranthaceae for the North American Flora. In a group to which so little attention had been given it was to be expected that more

than a few new species would be discovered. Some of these have been published during the past year.¹ A considerable number of others, chiefly in the genera *Iresine* and *Achyranthes*, are described in the present paper. The name *Achyranthes* is here used for the genus generally known as *Alternanthera*. The reasons for the use of the name in this sense the writer has recently explained at length.² He has also published a synoptic account of the North American representatives of the family.³

***Achyranthes panamensis* Standley, sp. nov.**

Stems weak and probably clambering over shrubs, herbaceous, much branched, the branches slender, angulate, short-pilose with solitary or fasciculate, spreading or reflexed hairs; petioles 1 to 4 mm. long; leaf blades oblong-elliptic or ovate-oblong, 2 to 5.5 cm. long, 0.6 to 2 cm. wide, acute or acuminate, acutish at the base, firm, bright green, appressed-pilose on both surfaces with short slender fulvous hairs; peduncles axillary and terminal, simple or usually branched, 1 to 6 cm. long, slender, densely short-pilose; spikes usually solitary, globose-ovoid or short-cylindric, 8 to 11 mm. long, 7 mm. thick; bracts broadly ovate, acuminate, glabrous; bractlets broadly ovate, half as long as the sepals, aristate-acuminate, sparsely short-villous; sepals lance-oblong, 2.5 mm. long, acute or acutish, 3-nerved, purplish (brownish or fuscous when dry), glabrous; filaments short, linear-subulate; staminodia equaling or exceeding the anthers, two-thirds as long as the sepals or shorter, lacerate at the apex; style short, the stigma entire; seed subglobose, 1 mm. long, black and shining.

Type in the Herbarium of Columbia College (New York Botanical Garden), collected in Panama by Sutton Hayes (no. 944).

In floral characters this plant is similar to *Achyranthes mexicana* (Schlecht. & Cham.) Standley, but in that species the slender peduncles are simple and the flowers are white or slightly stramineous.

***Achyranthes williamsii* Standley, sp. nov.**

Stems herbaceous, clambering over shrubs and herbs, sparsely branched, the branches stout, striate, cinereous-puberulent; petioles stout, 2 to 10 mm. long; leaf blades oblong, ovate-oblong, or rarely elliptic, 2.5 to 8 cm. long, 8 to 33 mm. wide, acute, acutish, or obtuse at the apex, acute or obtuse at the base, pubescent on both surfaces with very short, lightly appressed hairs, bright green, rather thick; peduncles axillary, simple or rarely branched, 2 to 6 cm. long, stout, cinereous or glabrate; heads solitary, short-cylindric or ovoid, 1 to 3 cm. long, 10 to 12 mm. thick; bracts broadly ovate, acuminate, glabrous; bractlets half as long as the sepals, ovate, aristate-acuminate, short-pilose; sepals narrowly lance-oblong, 5 mm. long, acuminate, whitish or stramineous, 3-nerved, short-pilose, the tips slightly spreading; filaments very short, the staminodia ligulate, longer than the anthers and slightly shorter than the sepals, lacerate at the apex; style evident, the stigma entire.

Type in the U. S. National Herbarium, no. 678206, collected near Citura, Panama, April 14, 1908, by R. S. Williams (no. 675).

¹ Standley, Paul C. New or notable species of *Amaranthus*. Bull. Torrey Club 41: 505-510. 1914. A new species of *Achyranthes* from Tobago. Proc. Biol. Soc. Washington 28: 87. 1915.

² The application of the generic name *Achyranthes*. Journ. Washington Acad. Sci. 5: 72-76. 1915.

³ The North American tribes and genera of *Amaranthaceae*. Journ. Washington Acad. Sci. 5: 391-396. 1915.

ADDITIONAL SPECIMENS EXAMINED:

PANAMA: Ancón, April 20, 1911, *Mrs. G. N. McMillan* (Herb. Gray). Without locality, *Seemann* (Herb. Gray). Ahorca Lagarto, 1905, *Cowell* 255 (Herb. N. Y.).

NICARAGUA: San Juan del Sur, *Torrey* (Herb. Gray). Island Ometepe, Lake Nicaragua, January, 1893, *C. L. Smith* (Herb. Gray).

This plant has no very close relatives among the previously described species reported from Central America, unless it may be *Achyranthes pycnantha* (Benth.) Standley. In that the sepals are densely long-pilose and 6 to 7 mm. long, the leaves are nearly glabrous, and the peduncles are usually branched.

***Achyranthes stenophylla* Standley, sp. nov.**

Stems slender, branched, the branches ascending or suberect, striate, very sparsely pilose or glabrate; leaves numerous, the internodes short, the petioles 2 to 10 mm. long; leaf blades linear to elliptic-linear, 2.5 to 5 cm. long, 3 to 6 mm. wide, acute or acutish, acuminate at the base, very sparsely appressed-pilose or glabrate; peduncles axillary, simple, 2 to 5 cm. long, short-pilose, very slender; spikes ovoid or short-cylindric, 6 to 10 mm. long, 6 mm. thick; bracts broadly ovate, acute, glabrous; bractlets half as long as the sepals, acuminate, long-aristate, sparsely short-villous; sepals lance-oblong, 2.5 mm. long, acute or acutish, membranaceous, 3-nerved, sparsely short-pilose, stramineous, the tips erect or slightly incurved; filaments short, the staminodia ligulate, longer than the anthers, two-thirds as long as the sepals, lacerate at the apex; style evident, the stigma entire.

Type in the Herbarium of Columbia College (New York Botanical Garden), collected in Panama by Sutton Hayes (no. 941).

This plant belongs to the same group as *A. pycnantha*, *A. williamsii*, and *A. cordobensis*, but it is very distinct from all of them in its smaller spikes and very narrow leaves.

***Achyranthes laguroides* Standley, sp. nov.**

Erect or ascending, suffruticose below, the stems 1 meter long or less, much branched, the branches striate, sparsely pilose-strigose or glabrate; leaves very shortly petiolate, the blades narrowly lanceolate to elliptic-linear, 1.5 to 5.5 cm. long, 2 to 6 mm. wide, acuminate or attenuate at both ends, pilose-sericeous, densely so beneath; peduncles simple or branched, 5 to 20 mm. long, or the heads often sessile or subsessile, the peduncles densely pilose-sericeous; spikes ovoid or short-cylindric, 1 to 2 cm. long, 9 mm. thick, the flowers whitish-stramineous; bracts and bractlets ovate-triangular, half as long as the sepals, acuminate or long-acuminate, sparsely pilose or glabrate; sepals linear-oblong, 4 to 5 mm. long, acuminate, membranaceous, 1-nerved, pilose near the base with straight erect jointed white hairs, these equaling or slightly exceeding the sepals; stamen tube elongate, the antheriferous lobes short; staminodia ligulate, exceeding the anthers, deeply and acutely lacinate at the apex; style elongate.

Type in the U. S. National Herbarium, no. 471849, collected near San Francisco de Guadalupe, Costa Rica, May, 1893, by A. Tonduz (Inst. Fís. Geogr. Costa Rica no. 8006). There is a specimen of the same plant in the herbarium of the Missouri Botanical Garden, collected somewhere in Costa Rica in April, 1910, by G. C. Worthen.

The species is a very distinct one. It is to be placed nearest *Achyranthes stenophylla*, but that has flowers only half as large and sparsely short-pilose sepals.

***Achyranthes cordobensis* Standley, sp. nov.**

Plants much branched, the branches spreading, loosely short-pilose, or glabrate in age; petioles 1 to 3 mm. long; leaf blades ovate-oblong or oval, or the uppermost lance-oblong, 3 to 6 cm. long, 8 to 20 mm. wide, rather abruptly long-acuminate, obtuse at the base, thin, densely pilose-sericeous beneath, less densely so on the upper surface; peduncles simple, axillary, 2 to 6 cm. long, pilose with ascending hairs; spikes solitary, rarely sessile, ovoid or short-cylindric, 8 to 15 mm. long, 11 mm. thick;

bracts and bractlets half as long as the sepals, broadly ovate, aristate-acuminate, subscarious, stramineous; sepals lance-oblong, 5 mm. long, acutish, subcartilaginous in age, 3-nerved, stramineous, sparsely short-pilose, the tips slightly spreading; stamen tube short; staminodia much exceeding the anthers, less than half as long as the sepals, ligulate, deeply fimbriate at the apex; style evident, the stigma entire.

Type in the U. S. National Herbarium, no. 125547, collected in the Valley of Córdoba, Mexico, February 11, 1866, by Bourgeau (no. 1946).

Related to *A. williamsii*, described above, but differing in the long-acuminate or abruptly acuminate leaves, which are densely pilose-sericeous beneath, and in the merely acutish, rather than acuminate, sepals.

***Gomphrena dispersa* Standley, sp. nov.**

Gomphrena decumbens Moq. in DC. Prodr. 13¹: 410. 1849, in part, not *G. decumbens* Jacq.

Gomphrena decumbens genuina Stuchlík, Repert. Nov. Sp. Fedde 11: 156. 1912, in part, not *G. decumbens* Jacq.

Gomphrena decumbens grandifolia Stuchlík, Repert. Nov. Sp. Fedde 11: 157. 1912, in part.

Prostrate or procumbent annual or perennial, much branched, the branches 20 to 100 cm. long, slender, sparsely or densely appressed-pilose; leaves numerous, short-petiolate, the blades oval-obovate to oblong, 1.5 to 5 cm. long, 5 to 20 mm. wide, obtuse to rounded at the apex, mucronate, acuminate to attenuate at the base, bright green, pilose-sericeous, often glabrate on the upper surface; spikes usually solitary, terminal or axillary, subglobose or short-cylindric, 9 to 13 mm. in diameter, each subtended by 2 acute sessile leaves, these usually shorter than the spikes; bracts rounded-ovate, acuminate, white, often denticulate; bractlets 5 to 6 mm. long, about 3 times as long as the bracts, thin, acute to obtuse, white or rarely purplish red, narrowly cristate at the apex, the crest extending along the keel for only a short distance, denticulate or laciniate; perianth usually equaling the bractlets, densely lanate, the lobes oblong-linear, acuminate or attenuate, white; stamen tube commonly included; style elongate, the stigmas slender; seed 1.5 mm. long, reddish brown, shining.

Type in the U. S. National Herbarium, no. 698287, collected at the edge of a cultivated field, Sierra de Anafe, Pinar del Río, Cuba, December 21, 1911, by Percy Wilson and Brother León (no. 11485).

ADDITIONAL SPECIMENS EXAMINED:

FLORIDA: Waste ground, near Tampa, 1913, *Tidestrom* 7005. Without locality, *Rugel* 98.

MEXICO: Guadalajara, Jalisco, 1886, *Palmer* 238. Atlixco, Puebla, 1893, *Nelson*. Valley of Oaxaca, 1894, *Nelson* 1307. Corral de las Piedras, vicinity of Zacuapan, Veracruz, 1906, *Purpus* 2284. Yucatán, *Gaumer* 369 pt. Vicinity of Mérida, Yucatán, 1912, *Collins* 11.

GUATEMALA: Escuintla, 1890, *J. D. Smith* 1977. Livingston, 1905, *von Türckheim* (J. D. Smith, no. 8738). Morán, Depart. Amatitlán, *Kellerman* 4840.

NICARAGUA: *C. Wright*.

EL SALVADOR: *Renson* 154.

COSTA RICA: Hacienda Babilonia, *Tonduz* 215. Río Hondo, Plains of Santa Clara, 1903, *Cook & Doyle* 596. Nicoya, 1900, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 13701).

CUBA: Herradura, 1907, *Earle* 766. Vicinity of La Gloria, Camaguey, 1909, *Shafer* 63. San Luis, Province of Pinar del Río, 1911, *Britton*, *Britton & Cowell* 9738. Isle of Pines, 1904, *Curtiss* 410; 1901, *A. A. Taylor* 88; 1900, *Palmer & Riley* 1117. Pinar del Río, 1900, *Palmer & Riley* 45. Camaguey to Santayana, 1909, *Britton* 2350.

JAMAICA: Up Park Camp, 1912, *Harris* 11542.

PORTO RICO: Santurce, 1913, *Chase* 6345½.

The specimens cited above are only a part of those examined by the writer. The species appears to be very abundant in the Greater Antilles and along the eastern coast of Central America, occurring chiefly as a weed in waste or cultivated ground. It has always been confused with *Gomphrena decumbens* Jacq., described in 1804. It is remarkable that a plant so common in the West Indies has never received a name, but apparently no one has ever questioned its identity with Jacquin's species.

Gomphrena decumbens was described¹ from cultivated specimens whose origin was not known. The description is ample and fortunately is accompanied by an excellent plate. There is no doubt that it applies to a plant which is common from eastern and central Mexico to Guatemala and is found also in South America. So far as the writer knows, it does not occur in the West Indies. It differs from *Gomphrena dispersa* in having the crests of the bractlets widest much below the apex, if they are perceptibly widest anywhere, the flowers thus appearing pointed or acuminate. Moreover, the bractlets are much longer than the flowers, while in *G. dispersa* they equal or are shorter than the perianth. In the latter species the crests are widest at or near the apex of the bractlets, and the flowers thus appear obtuse or merely acutish. In *Gomphrena decumbens*, furthermore, the flowers are very frequently tinged with red, or are yellowish, while in the proposed new species they are a dull, clear white. It is very probable that *G. dispersa* is to be found also in northern South America, but so far no specimens have been seen nor do any of the descriptions of species from that region appear to apply to it.

***Gomphrena parviceps* Standley, sp. nov.**

Gomphrena decumbens pringlei Stuehlk, Repert. Nov. Sp. Fedde 11: 156. 1912, in part, not *G. pringlei* Coult. & Fish. 1892.

Prostrate or procumbent annual, much branched, the stems 10 to 30 cm. long, slender or stout, often tinged with red, appressed-pilose; leaves numerous, subsessile, the blades oblong or spatulate, 1 to 3.5 cm. long, 4 to 10 mm. wide, rounded or obtuse at the apex, acutish at the base, green, appressed-pilose beneath, glabrate above; spikes solitary or glomerate, terminal or axillary, subglobose, 7 mm. in diameter, each spike or cluster of spikes subtended by 2 or several sessile leaves, these usually 2 to 3 times as long as the spikes; bracts broadly ovate, acuminate; bractlets 3 mm. long, scarious, white, tinged with pink, twice as long as the bracts, narrowly cristate at the apex, the crest obscurely denticulate, pink or white; perianth conspicuously exceeding the bractlets, the lobes oblong, obtuse, truncate, or emarginate at the apex, the outer ones subcoriaceous, white or pink, glabrous, the inner ones thin, bright green except along the margin, very sparsely lanate; stamen tube about equaling the perianth; style elongate, the stigmas filiform; seed ovoid, 1.5 mm. long, reddish brown.

Type in the U. S. National Herbarium, no. 354471, collected in the Valley of Mexico, Federal District, Mexico, altitude 2,190 meters, October 3, 1899, by C. G. Pringle (no. 8251).

Related to *Gomphrena pringlei* Coult. & Fish., but in that species the calyx lobes are acute and the perianth merely equals the bractlets instead of exceeding them.

***Gossypianthus brittonii* Standley, sp. nov.**

Caudex much branched both above and below the surface of the soil, the branches stout or slender; stems numerous, prostrate, 4 to 9 cm. long, slender, lanate when young but soon glabrate; basal leaves petiolate, the blades oblanceolate, 6 to 8 mm. long, 1.5 to 2 mm. wide, obtuse or acutish, pilose above, pilose-sericeous beneath; cauline leaves short-petiolate, the blades orbicular to oval, 2 to 4 mm. long, obtuse or rounded at the apex, glabrate above, pilose beneath; flowers glomerate, the glomer-

¹ Jacq. Pl. Hort. Schönbr. 4: 41. pl. 482. 1804.

ules much longer than the subtending leaves; bracts ovate to orbicular-ovate, nearly equaling the sepals, obtuse or rounded at the apex, white, scarious, glabrous; sepals 2.5 to 3 mm. long, lance-oblong, acute, faintly 3-nerved, green along the nerves, the margins white and scarious; filaments linear, dilated at the base; utricle oval; seed oval, 1.2 mm. long, brown, shining.

Type in the herbarium of the New York Botanical Garden, collected on a rocky hill in a palm barren, Santa Clara, Cuba, April, 1912, by N. L. Britton and J. F. Cowell (no. 13318).

Apparently there are two species of *Gossypianthus* in the West Indies. One of these, *G. lanuginosus*, was described from Santo Domingo, and is known also from Mexico and Texas. In the Bernhardt Herbarium (Herb. Mo. Bot. Gard.) there is a specimen from Santo Domingo, labeled *Achyranthes piloselloides* Poit., which agrees in all respects with the common Texan plant. The Cuban *Gossypianthus* is apparently distinct in having obtuse rather than acute or acuminate bracts and bractlets, a much branched caudex, and much smaller leaves.

***Iresine acicularis* Standley, sp. nov.**

Stems erect, stout, very sparsely pubescent with short slender hairs, the internodes 10 to 23 cm. long; petioles slender, 1 to 5.5 cm. long; leaf blades ovate or broadly ovate, 6.5 to 20 cm. long, 3.5 to 10 cm. wide, or those within the inflorescence somewhat smaller, rather abruptly long-attenuate or acute, rounded or obtuse at the base and abruptly short-decurrent, thin, bright green, very sparsely villous on the upper surface with short remote soft yellowish white hairs, similarly pubescent beneath and furnished in addition with numerous appressed shining amber-colored or bright yellow acicular hairs, villous-ciliate, rather prominently veined, but the veins slender, diverging at angles of from 50 to 70 degrees; inflorescence a broad, dense, somewhat leafy panicle, 25 cm. long and 15 cm. broad, the rachises sparsely villous and bearing in addition numerous stout, acicular, glistening amber-colored or yellow hairs, these most abundant at the base of the spikelets; spikelets alternate, pediceled or sessile, densely flowered, stout, 4 to 12 mm. long; bracts white, rounded-ovate to narrowly ovate, acute, from half as long to fully as long as the sepals; sepals about 1.5 mm. long, narrowly oblong, acute, those of the pistillate flowers 3-nerved, the flowers furnished at the base with copious long white wool; staminal cup not lobed; utricle shorter than the sepals; seed suborbicular, 0.5 mm. in diameter, dark reddish brown, shining.

Type in the U. S. National Herbarium, no. 399603, collected on the Volcán de Fuego, Department of Sacatepequez, Guatemala, at an altitude of 2,700 meters, February 20, 1905, by W. A. Kellerman (no. 4549).

ADDITIONAL SPECIMENS EXAMINED:

GUATEMALA: Near the Finca Sepacuité, 1902, *Cook & Griggs* 214.

COSTA RICA: Chirripó Farm, 1900, *Pittier* 16078.

The proposed species is related to *Iresine celosioides* L., but is distinguished by the dentate bracts, and more strongly by the peculiar pubescence of the inflorescence. No other species of the genus is known to have trichomes of the same form.

***Iresine arenaria* Standley, sp. nov.**

Erect perennial, suffrutescent at the base, much branched, the branches slender, erect-ascending, green, striate, glabrous; petioles slender, 4 to 5 mm. long; leaf blades linear to narrowly ovate, 2.5 to 4.5 cm. long, 2 to 12 mm. wide, acute or acuminate, obtuse to acuminate at the base, rather thick, deep green, glabrous; flowers polygamous, narrowly paniculate, the panicles open or congested, nearly naked, 4 to 20 cm. long, the branches slender or stout, ascending, short, the spikelets few, short or elongate, pedunculate or sessile, the rachis densely lanate; bracts and bractlets rounded-ovate, obtuse or acutish, short-cuspidate, hyaline, whitish-stramineous,

densely short-villous; sepals oblong-oval, 1.5 mm. long, rounded at the apex, 3-nerved, densely pilose with soft white hairs; filaments subulate-linear, shorter than the sepals, the staminodia one-third as long as the filaments, narrowly triangular, entire; style short, the stigmas slender; utricle orbicular, compressed; seed orbicular, 1 mm. broad, dark reddish brown, shining.

Type in the U. S. National Herbarium, no. 636123, collected on a dry hillside at Topolobampo, Sinaloa, Mexico, March 23, 1910, by J. N. Rose, P. C. Standley, and P. G. Russell (no. 13292). Also obtained at the same locality in 1897 by Edward Palmer (no. 191).

Similar in most respects to *Iresine angustifolia*, but distinguished by the well-developed staminodia, the obtuse or rounded rather than acute or acutish sepals, and the densely villous bracts.

***Iresine calea* (Ibáñez) Standley.**

Gomphrena latifolia Mart. & Gal. Bull. Acad. Sci. Brux. 10¹: 349. 1843.

Alternanthera latifolia Moq. in DC. Prodr. 13²: 351. 1849.

Achyranthes calea Ibáñez, Naturaleza 4: 79. 1879.

Iresine latifolia Benth. & Hook. Gen. Pl. 3: 42. 1880, not *I. latifolia* D. Dietr. 1839.

Iresine laxa S. Wats. Proc. Amer. Acad. 21: 454. 1886.

There are very few North American species of *Iresine* which have so extensive a list of synonyms as the present species. Usually it has been known as *Iresine latifolia* (Mart. & Gal.) Benth. & Hook., but that name is homonymous and consequently not available. In spite of the fact that Ibáñez uses several large pages of text and a colored plate to characterize his proposed species, the present writer is not absolutely certain that that plant is the same as the one heretofore known as *Iresine latifolia*. Ibáñez's description, however, applies better to the latter species than to any other of which the writer has seen specimens, and his material came from a region in which *I. latifolia* is known to grow; for which reasons it seems best to use Ibáñez's name in this application, at least for the present.

***Iresine costaricensis* Standley, sp. nov.**

Scandent shrub, much branched, the branches stout, terete, smooth, the younger ones and those of the inflorescence densely pubescent with short stout appressed fulvous hairs; petioles stout, 7 to 17 mm. long; leaf blades oval to oblong-elliptic, 11 to 18 cm. long, 4 to 7 cm. wide, abruptly acuminate or long-attenuate, obtuse at the base, thick, sparsely short-villous on the upper surface and deep green, appressed-pilose beneath with slender stiff hairs; flowers perfect, in a loose, much branched, naked, terminal panicle sometimes 50 cm. long, the branches slender, spreading, opposite or verticillate, the spikelets 3 mm. thick or less, sessile, few-flowered, the rachis canescent; bracts and bractlets less than half as long as the sepals, suborbicular, fuscous-stramineous, sparsely short-villous; sepals oval-oblong, 1.5 mm. long, obtuse, 3-nerved, brownish-fuscous, densely pilose, the hairs stiff, grayish, scarcely exceeding the sepals; filaments shorter than the sepals, the staminodia short, entire; style short, the stigmas short and stout.

Type in the U. S. National Herbarium, no. 861225, collected at Las Vueltas, Tucurrique, Costa Rica, in 1899, by A. Tonduz (Inst. Fís. Geogr. Costa Rica, no. 13183). Also collected at the same locality by the same collector in 1898 (no. 12919).

The proposed species belongs to that section of the genus which was once given generic rank by Martius under the name *Trommsdorffia*. It is a relative of *Iresine argentata* (Mart.) D. Dietr., a species occurring in Porto Rico, Colombia, and Venezuela, which has larger flowers, mostly pedunculate spikelets, and acute or abruptly acute leaf blades.

***Iresine heterophylla* Standley, sp. nov.**

Iresine celosioides obtusifolia Coulter, Contr. U. S. Nat. Herb. 2: 364. 1894.

Iresine paniculata obtusifolia Coulter; Uline & Bray, Bot. Gaz. 21: 354. 1896.

Perennial from long slender branching woody rootstocks; stems herbaceous, stout, erect or ascending, solitary or several from a single base, simple up to the inflorescence, 50 to 100 cm. high, swollen at the nodes, often sulcate, short-villous at the nodes, sparsely pubescent elsewhere with very short stout soft hairs, the internodes 1.5 to 10 cm. long; leaves usually asymmetrical, very variable in outline, the lower ones much broader and more obtuse than the upper ones; petioles stout, 2 to 20 mm. long, the uppermost leaves usually sessile or subsessile; blades of the lower leaves broadly rhombic-ovate, often as broad as long, frequently with fascicles of small leaves in the axils, 3 to 6 cm. long, 2 to 4 cm. wide, rounded to acutish, the apex always blunt, rounded or abruptly acute at the base and more or less decurrent, thick and firm, yellowish green, scabrous or smooth on the upper surface, pubescent beneath along the veins with short stiff hairs, scabrous and denticulate on the margins, the veins prominent beneath, coarse, the lateral ones diverging at a very acute angle, nearly parallel and all extending more than halfway to the margin; blades of the upper leaves ovate to narrowly ovate or oval, obtuse or acute, smaller than the lower blades but with similar pubescence; inflorescence a narrow, dense, much branched panicle 15 to 40 cm. long and 3 to 9 cm. broad, the branches erect or ascending, sparsely villous; spikelets stout, densely flowered, 4 to 23 mm. long; bracts one-half to one-third as long as the sepals, ovate-orbicular, acute, entire; sepals 1 to 1.3 mm. long, elliptic-oblong, yellowish white, acuminate to acutish, those of the pistillate flowers 3-nerved; lobes of the staminal cup broadly rounded; utricle shorter than the sepals; seed suborbicular, 0.6 mm. in diameter, dark reddish brown, shining.

Type in the U. S. National Herbarium, no. 304251, collected near the city of Durango, Mexico, in 1896, by Edward Palmer (no. 562).

ADDITIONAL SPECIMENS EXAMINED:

TEXAS: Wright 587. Mexican Boundary Survey 1199. Nealley 231. Uvalde, 1880, Palmer 1137. Lindheimer 1110. Georgetown, 1880, Palmer 1135.

NEW MEXICO: Gila Hot Springs, 1903, Metcalfe 827 (Herb. N. Y.).

ARIZONA: Mule Mountains, 1911, Goodding 1009.

SONORA: Oputo, 1894, Hartman 213.

CHIHUAHUA: Candelaria, 1911, Stearns 235. 1885, Palmer 291. Santa Eulalia Hills, 1885, Wilkinson. Near Chihuahua, 1885, Pringle 348.

COAHUILA: 1880, Palmer 1136. Sierra de Paila, 1910, Purpus 5086 (Herb. Univ. Calif.).

The specimens listed above have been referred to *Iresine celosioides*, but that widely dispersed plant is an annual, or essentially so, with all its leaves similar, and the sepals of the pistillate flowers obtuse or merely acutish.

***Iresine nitens* Standley, sp. nov.**

Erect shrub, sparsely branched, the branches erect, striate, densely and closely pilose-sericeous with lustrous silvery white hairs, glabrate in age; petioles 5 to 7 mm. long; leaf blades lanceolate or ovate-lanceolate, 2 to 6 cm. long, 5 to 13 mm. wide, long-acuminate or acute, acute at the base, thick and firm, when young strigose-pilose with lustrous white hairs, soon glabrate, the lateral veins conspicuous, ascending; flowers dioecious, paniculate, the panicle on a long naked peduncle, very narrow, elongate, the simple primary branches very short, the spikelets elongate, mostly sessile, the rachis densely lanate; bracts and bractlets of the pistillate flowers equaling the sepals, ovate or ovate-oblong, acute or acuminate, hyaline, stramineous or fuscous, glabrous, the sepals narrowly lanceolate, 2 mm. long, long-attenuate, 3-nerved, densely lanate, the long soft hairs brownish; style nearly as long as the ovary, the stigmas short, slender; utricle oblong, acute; seed 1 mm. long, yellowish brown, shining.

Type in the U. S. National Herbarium, no. 464048, collected at Tehuacán, Puebla, Mexico, September, 1911, by C. A. Purpus (no. 5667).

Closely related to *Iresine schaffneri* S. Wats., but distinguishable by the lustrous pubescence of the stems and by the fact that the leaves are early glabrate rather than permanently pubescent.

***Iresine pacifica* Standley, sp. nov.**

Erect shrub, much branched, the branches ascending, slender, striate, green, glabrous except about the inflorescence, there very sparsely short-villous; petioles slender, 4 to 11 mm. long; leaf blades broadly ovate or rhombic-ovate to lance-oblong, or the uppermost lanceolate, 3.5 to 10.5 cm. long, 1.3 to 4 cm. wide, acute to long-acuminate, acute at the base, thin, glabrous, or very sparsely short-villous along the veins beneath; flowers polygamo-monœcious, in broad, open, much branched, sparsely leafy panicles, the branches elongate, very slender, ascending or spreading, the spikelets short, nearly all sessile, the rachis lanate; bracts and bractlets less than half as long as the flowers, suborbicular, rounded at the apex, short-villous, brown; sepals oval-oblong, 1.5 mm. long, rounded at the apex, 3-nerved, densely pilose with long soft brownish hairs; filaments shorter than the sepals, the staminodia less than half as long as the filaments, narrowly triangular, entire; style short, the stigmas slender; seed orbicular, slightly compressed, 0.6 mm. broad, black and shining.

Type in the U. S. National Herbarium, no. 208570, collected near Manzanillo, Mexico, December, 1890, by Edward Palmer (no. 1074).

ADDITIONAL SPECIMENS EXAMINED:

MEXICO: Manzanillo, 1890, *Palmer* 932. Cerro Colorado, Sinaloa, November 1, 1904, *Brandeggee*.

This species is related to *Iresine angustifolia* Euphrasén (*I. elatior* Rich.), but is readily distinguished by the rounded or obtuse bracts and bractlets and the broader leaves.

***Iresine rotundifolia* Standley, sp. nov.**

Low shrub, fruticose nearly throughout, much branched, the branches stout, ascending or divergent, dark gray or blackish, the branchlets stout, densely tomentose; leaves few, remote, undeveloped in the staminate plant at anthesis; petioles stout, 1 to 4 mm. long; leaf blades orbicular to broadly ovate-oval, 3.5 to 17 mm. long, 3.5 to 12 mm. wide, broadly rounded at the base, rounded or obtuse at the apex, sometimes emarginate, coriaceous, deep green and puberulent or glabrate on the upper surface, densely yellowish-tomentose beneath, the veins conspicuous beneath and usually evident on the upper surface; flowers dioecious; staminate spikelets 6 to 9 mm. long, densely flowered, in fascicles of 2 to 4 at the ends of short fruticose branches; bracts and bractlets ovate-orbicular, less than a third as long as the sepals, scarious, yellowish white, glabrous or nearly so, the sepals narrowly oblong, 3 mm. long, obtuse, sparsely short-villous at the apex; filaments slightly exserted, the tube very short, the staminodia minute; pistillate spikes (immature) short, densely flowered, in short, narrow terminal panicles, the bracts and bractlets broadly ovate, obtuse or acute, fuscous, glabrate.

Type in the herbarium of the University of California (fragment in the U. S. National Herbarium), no. 135872, collected in the vicinity of San Luis Tultitlanapa, Puebla, Mexico, May, 1908, by C. A. Purpus (no. 3452). This specimen is taken from a staminate plant. The pistillate plant, with the inflorescence very immature, was collected at Esperanza in May, 1911, by C. A. Purpus (no. 5864), this also in the herbarium of the University of California.

A very distinct species, because of the prevailingly suborbicular leaves and the peculiar form of the staminate inflorescence.

***Iresine stricta* Standley, sp. nov.**

Erect shrub, 30 to 80 cm. high, sparsely branched, the branches suberect, slender or stout, striate, densely stellate-canescens; petioles stout, 2 to 6 mm. long; leaf blades oblong-oval, ovate-oblong, broadly ovate, or ovate-rhombic, 1.3 to 3.5 cm. long, 5 to 15 mm. wide, rounded or obtuse at the apex, obtuse or rounded at the base, subcoriaceous, stellate-canescens on the upper surface when young, glabrate in age, densely stellate-canescens beneath, subrugose, the veins coarse, prominent beneath, ascending; flowers dioecious, the panicle on a naked peduncle 10 to 15 cm. long, narrow, the primary branches elongate and ascending or usually very short; spikelets elongate, slender, sessile, the rachis lanate; bracts and bractlets of the staminate flowers half as long as the sepals, broadly ovate, pilose, the sepals oblong, obtuse or acute, pilose, hyaline, dull white; filaments equaling the sepals, the staminodia short, fimbriate at the apex; bracts and bractlets of the pistillate flowers equaling the sepals, pilose, the sepals ovate-lanceolate, 1.5 mm. long, acuminate, 3-nerved, white, densely long-pilose, the hairs exceeding the perianth, soft, white; stigmas elongate, filiform; seed 1 mm. long, reddish brown, shining.

Type in the U. S. National Herbarium, no. 453412, collected near Tehuacán, Puebla, Mexico, in 1905, by J. N. Rose, J. H. Painter, and J. S. Rose (no. 9919).

ADDITIONAL SPECIMENS EXAMINED:

PUEBLA: San Luis Tultitlanapa, 1907, *Purpus* 2834. Cerro de Coatepec, August, 1907, *Purpus* 2757 (Herb. Univ. Calif.).

In general appearance and in floral characters near *Iresine schaffneri* S. Wats., but clearly distinct in its indument of branched hairs.

***Iresine tomentella* Standley, sp. nov.**

Shrub; branches slender, sparsely whitish-tomentose when young, glabrate in age; petioles 0.8 to 1.5 cm. long, tomentulose when young; leaf blades oblong-elliptic, elliptic, or oblanceolate-oblong, 12.5 to 21.5 cm. long, 3.3 to 6.5 cm. wide, cuneate at the base, acute or long-acuminate at the apex, usually somewhat abruptly so, thin, bright green, glabrous above, loosely tomentose beneath along the veins when young, glabrate in age, the lateral veins conspicuous, arcuate-ascending; flowers polygamous, loosely paniculate, the panicle 9.5 cm. long and as broad, the branches ascending, thinly tomentose, the basal bracts linear, 2 to 2.5 cm. long; spikelets sessile, few, flowered, 2 to 2.5 mm. in diameter, the rachis lanate; bracts and bractlets ovate-orbicular, half as long as the sepals, obtuse or acutish, stramineous, hyaline, glabrous; sepals oval, 1.5 to 2 mm. long, obtuse, sparsely lanate at the base, stramineous; staminodia minute.

Type in the U. S. National Herbarium, no. 572522, collected near Gómez Farias-Tamaulipas, Mexico, altitude 350 meters, April, 1907, by Edward Palmer (no. 291).

A near relative of *Iresine arbuscula* Uline & Bray, which is known only from the type locality, Volcán de Tecuamburro, Guatemala, but differing from that species by the tomentose branches and leaves and shorter petioles.

***Iresine wrightii* Standley, sp. nov.**

Shrub; branches slender, terete, smooth, the young ones and those of the inflorescence densely canescens; petioles stout, 3 to 7 mm. long; leaf blades obovate-oblong or oval-oblong, broadest above the middle, 7 to 9 cm. long, 3 to 4 cm. wide, acute at the apex, acute or acuminate at the base, rather thin, sparsely appressed-pilose beneath or glabrate; flowers perfect, paniculate, the panicles pyramidal, loosely branched, naked, the branches spreading, opposite, the spikelets short, pedunculate or sessile; bracts and bractlets one-third as long as the sepals, suborbicular, stramineous, sparsely short-villous or glabrate; sepals elliptic-oblong, 2.5 mm. long, acute, brownish-fuscous, faintly nerved, short-villous at the apex, pilose at the base, the hairs sordid white, stiff, about equaling the sepals; filaments filiform, shorter than the sepals, the staminodia very short, entire; style short, the stigmas short and stout.

Type in the U. S. National Herbarium, no. 48566, collected in Nicaragua by Charles Wright.

This, like *Iresine costaricensis*, is related to *I. argentata*. It differs from the latter, however, in having thin rather than subcoriaceous leaf blades, which are acute at the base and broadest above the middle, rather than rounded at the base and broadest at or below the middle.

NEW OR NOTABLE ALLIONIACEAE.

In the course of preparing a monograph of the North American representatives of the genus *Torrubia* two undescribed species have been discovered—one from Mexico and one from Guadeloupe. This group has usually been referred to *Pisonia*, but several years ago Dr. N. L. Britton showed¹ the inconsistency of retaining it in that genus, and transferred to it all the West Indian species then known. A number of West Indian species of *Pisonia* have since been described which are properly referable to *Torrubia* and are here transferred to that genus. At the same time it seems desirable to make the proper nomenclatorial combinations for the South American species of *Torrubia*. There is appended also a description of a new Panamanian species of the closely related genus *Neea*.

Several years ago the writer proposed the name *Commicarpus*² for that section of the genus *Boerhaavia* having glanduliferous fruits borne in umbels or verticels. The genus is well marked, besides, by the scandent habit of the plants. At the time the new genus was proposed only the Mexican species were transferred to it. Most of the other species are African. The writer takes this opportunity of transferring them, also, to *Commicarpus*.

Two South American Allioniaceae, also, described as species of *Mirabilis*, are here transferred to *Allionia*.

Neea delicatula Standley, sp. nov.

Branches slender, greenish gray, glabrous, the branchlets slender, ferrugino-puberulent when young but soon glabrate, the internodes short; petioles slender, 4 to 7 mm. long; leaves alternate, the blades elliptic, elliptic-obovate, or oblong-oval, 2.2 to 6 cm. long, 9 to 20 mm. wide, cuneate to acutish at the base, abruptly acuminate at the apex, the tip narrowly triangular, acutish or usually obtuse, the blades thin, deep green, concolorous, glabrous and dull on the upper surface, sparsely rufo-puberulent beneath along the midvein, the margins plane, the lateral veins obsolete or nearly so; peduncles of the staminate cymes 2.2 to 4.5 cm. long, terminal and axillary, nearly filiform, flexuous, glabrous, the cymes few or many-flowered, 2 to 5 cm. wide, the flowers on slender pedicels 4 to 15 mm. long; bractlets triangular-oblong, acute, 1 mm. long, puberulent; staminate perianth urceolate, acutish at the base, 4.5 mm. long, 3 mm. wide, puberulent at the apex, elsewhere glabrate, minutely 5-dentate; stamens 7, the filaments very unequal, the anthers 1 mm. long; pistillate flowers and fruit not known.

¹ Bull. Torrey Club 31: 611-615. 1904.

² Contr. U. S. Nat. Herb. 12: 373. 1909.

Type in the U. S. National Herbarium, no. 678516, collected in forests on dry limestone around Alhajuela, Chagres Valley, Panama, altitude 30 to 100 meters, May, 1911, by H. Pittier (no. 3472).

Related to *Neea psychotrioides*, but that species has much larger leaves with more conspicuous veins, broader cymes which are more pubescent, a larger perianth, and usually 5 stamens.

Torrubia dussii Standley, sp. nov.

Pisonia obtusata Heimerl, Bot. Jahrb. Engler **21**: 624. 1896, in part, not *P. obtusata* Jacq.

Tree of medium size; branches stout, rugose, sordid-grayish, the branchlets stout, glabrous except along the nodes, there puberulent, the internodes short; leaves opposite, unequal, the petioles rather stout, 4 to 8 mm. long, glabrous; leaf blades oval or oval-oblong, 8 to 10 cm. long, 4 to 6 cm. wide, rounded or obtuse at the base, abruptly acute or cuspidately short-acuminate at the apex, rarely acute, the tip usually obtuse, thin, concolorous, lustrous above, dull beneath, glabrous, the margins plane, the lateral veins slender, straight, 6 to 12 on each side, the veinlets nearly obsolete, laxly and sparsely reticulate; peduncles stout, 3.5 to 4.5 cm. long, glabrous, the inflorescence cymose, 6 to 8 cm. broad, many-flowered, glabrous, the branches stout, the flowers sessile, glomerate, the bractlets oblong or deltoid-oblong, acutish, 1 mm. long or shorter, glabrous; staminate perianth funnelform-campanulate, 6 to 7 mm. long, glabrous, the limb nearly entire; stamens 6, half longer than the perianth; anthocarp ellipsoid, 11 mm. long, 3 mm. in diameter.

Type in the U. S. National Herbarium, no. 592420, collected in Guadeloupe, April 15, 1893, by Père Duss (no. 2170).

Related to *Torrubia fragrans*, but distinct in the large, nearly glabrous staminate perianth and the glabrous branches of the inflorescence.

Torrubia potosina Standley, sp. nov.

Branches slender, grayish, striolate, the branchlets slender, sparsely ferrugino-puberulent when young, the internodes 1.5 to 7 cm. long; leaves opposite, subequal or unequal, the petioles slender, 4 to 6 mm. long, sparsely ferrugino-puberulent; leaf blades oval or oblong-oval, rarely orbicular-oval, 5 to 10.5, or rarely only 3.5, cm. long, 2.2 to 5 cm. wide, rounded or acutish at the base, acute or usually cuspidately acute or acuminate at the apex, thin, glabrous, concolorous, slightly lustrous on the upper surface, the lateral veins prominent, divergent, nearly straight, about 8 on each side, laxly anastomosing near the margins, the secondary veins laxly and inconspicuously reticulate; pistillate peduncles terminal and axillary, 2.5 to 7.5 cm. long, very slender, sparsely puberulent or glabrous, the inflorescence few-flowered, cymose-paniculate, 1.5 to 3.5 cm. long, the branches opposite or dichotomous, divergent, sparsely ferrugino-puberulent, the flowers solitary or in cymules of 3, sessile or on pedicels 4 mm. long or shorter, the bractlets acute, about 0.5 mm. long, puberulent; pistillate perianth elliptic-oblong, 2.5 to 3 mm. long, slightly constricted in the throat, sparsely puberulent, the teeth triangular, acute, erect; anthocarp oval, 7 mm. long and 4.5 mm. in diameter; fruit finely striate; seed elliptic-oblong, 6 mm. long and 2.5 to 3 mm. in diameter, brown.

Type in the U. S. National Herbarium, no. 570197, collected near Rascón, San Luis Potosí, Mexico, June, 1905, by Edward Palmer (no. 675).

The proposed species is of particular interest, since it is the second *Torrubia* to be reported north of Costa Rica. The other Mexican species, *T. linearibracteata*, has been described only recently, from Yucatán. *Torrubia potosina* is related, apparently, to *T. costaricana* and *T. linearibracteata*, but differs from both in its lax, few-flowered inflorescence and broader leaves.

Torrubia areolata (Heimerl) Standley.

Pisonia areolata Heimerl, Nat. For. Kjöbenhavn Vid. Medd. 1890: 159. 1891.

Torrubia boliviana (Britton) Standley.

Pisonia boliviana Britton, Bull. Torrey Club 27: 125. 1900; Heimerl, Bot. Jahrb. Engler 42: 80. 1908.

Torrubia cafferiana (Casar.) Standley.

Pisonia cafferiana Casar. Nov. Stirp. Bras. Dec. 68. 1842.

Torrubia campestris (Netto) Standley.

Pisonia campestris Netto, Ann. Sci. Nat. V. 5: 83. 1866.

Torrubia combretiflora (Mart.) Standley.

Pisonia combretiflora Mart.; Schmidt in Mart. Fl. Bras. 14²: 360. 1872.

Torrubia coriifolia (Heimerl) Standley.

Pisonia coriifolia Heimerl in Urban, Symb. Antill. 7: 213. 1912.

Torrubia cuspidata (Heimerl) Standley.

Pisonia cuspidata Heimerl, Bot. Jahrb. Engler 21: 628. 1896.

Torrubia domingensis (Heimerl) Standley.

Pisonia obtusata domingensis Heimerl in Urban, Symb. Antill. 7: 215. 1912.

Torrubia eggersiana (Heimerl) Standley.

Pisonia eggersiana Heimerl, Bot. Jahrb. Engler 21: 627. 1896.

Torrubia ferruginea (Klotzsch) Standley.

Pisonia ferruginea Klotzsch; Choisy in DC. Prodr. 13²: 445. 1849.

Torrubia fragrans (DuM. de Cours.) Standley.

Pisonia fragrans DuM. de Cours. Bot. Cult. ed. 2. 7: 114. 1814.

Pisonia inermis Jacq. err. det. Griseb. Fl. Brit. W. Ind. 71. 1864, in part.

Torrubia graciliflora (Mart.) Standley.

Pisonia graciliflora Mart.; Schmidt in Mart. Fl. Bras. 14²: 358. 1872.

Torrubia harrisiana (Heimerl) Standley.

Pisonia harrisiana Heimerl in Urban, Symb. Antill. 7: 214. 1912.

Torrubia hassleriana (Heimerl) Standley.

Pisonia hassleriana Heimerl, Oesterr. Bot. Zeitschr. 56: 426. 1906.

Torrubia hirsuta (Choisy) Standley.

Pisonia hirsuta Choisy in DC. Prodr. 13²: 445. 1849.

Torrubia laxiflora (Choisy) Standley.

Pisonia laxiflora Choisy in DC. Prodr. 13²: 444. 1849.

Torrubia ligustrifolia (Heimerl) Standley.

Pisonia ligustrifolia Heimerl in Urban, Symb. Antill. 7: 507. 1913.

Torrubia linearibracteata (Heimerl) Standley.

Pisonia linearibracteata Heimerl, Repert. Nov. Sp. Fedde 12: 221. 1913.

Torrubia luteovirens (Heimerl) Standley.

Pisonia luteovirens Heimerl, Oesterr. Bot. Zeitschr. 56: 425. 1906.

Torrubia microphylla (Heimerl) Standley.

Pisonia microphylla Heimerl in Urban, Symb. Antill. 7: 215. 1912.

Torrubia nitida (Mart.) Standley.

Pisonia nitida Mart.; Schmidt in Mart. Fl. Bras. 14²: 356. 1872.

Torrubia noxia (Netto) Standley.

Pisonia noxia Netto, Ann. Sci. Nat. V. 5: 80. pl. 7. 1866.

Torrubia olfersiana (Link, Klotzsch & Otto) Standley.

Pisonia olfersiana Link, Klotzsch & Otto Icon. Pl. Rar. 1: 36. pl. 15. 1841.

Torrubia pacurero (H. B. K.) Standley.

Pisonia pacurero H. B. K. Nov. Gen. & Sp. 2: 218. 1817.

Torrubia paraguayensis (Heimerl) Standley.

Pisonia paraguayensis Heimerl, Verh. Zool. Bot. Ver. Wien 62: 7. 1912.

Torrubia pernambucensis (Casar.) Standley.

Pisonia pernambucensis Casar. Nov. Stirp. Bras. Dec. 69. 1842.

Torrubia salicifolia (Heimerl) Standley.

Pisonia salicifolia Heimerl in Urban, Symb. Antill. 7: 216. 1912.

Torrubia schomburgkiana (Heimerl) Standley.

Pisonia schomburgkiana Heimerl, Jahresb. Staats-Oberrealsch. Fünfhaus 23:
[Reprint, 34.] 1897.

Torrubia tomentosa (Casar.) Standley.

Pisonia tomentosa Casar. Nov. Stirp. Bras. Dec. 69. 1842.

Torrubia suspensa (Heimerl) Standley.

Pisonia suspensa Heimerl, Med. Rijks Herb. Leiden 19: 34. 1913.

Torrubia uleana (Heimerl) Standley.

Pisonia uleana Heimerl, Bot. Jahrb. Engler 42: 80. 1908.

Torrubia venosa (Choisy) Standley.

Pisonia venosa Choisy in DC. Prodr. 13²: 444. 1849.

Commicarpus grandiflorus (A. Rich.) Standley.

Boerhaavia grandiflora A. Rich. Tent. Fl. Abyss. 2: 209. 1851.

Commicarpus plumbagineus (Cav.) Standley.

Boerhaavia plumbaginea Cav. Icon. Pl. 2: 7. pl. 112. 1793.

Commicarpus repandus (Willd.) Standley.

Boerhaavia repanda Willd. Sp. Pl. 1: 22. 1797.

Commicarpus squarrosus (Heimerl) Standley.

Boerhaavia squarrosa Heimerl, Bull. Herb. Boiss. 4: 813. 1896.

Commicarpus tuberosus (Lam.) Standley.

Boerhaavia tuberosa Lam. Tabl. Encycl. 1: 10. 1791.

Commicarpus verticillatus (Poir.) Standley.

Boerhaavia verticillata Poir. Dict. Sci. Nat. 5: 56. 1804.

Allionia arenaria (Heimerl) Standley.

Mirabilis arenaria Heimerl, Bot. Jahrb. Engler 42: 74. 1908.

Allionia campanulata (Heimerl) Standley.

Mirabilis campanulata Heimerl, Bot. Jahrb. Engler 42: 75. 1908.

NEW CAESALPINIACEAE FROM PANAMA.

The genus *Cassia* is represented in Panama by at least 20 species of diverse forms. Three of them appear to be new and are described here. There occur in the same region 10 species of *Chamaecrista*, one of which is undescribed. In this connection there are included also two new combinations in *Chamaecrista*, for species occurring in Panama.

***Cassia falcinella* Standley, sp. nov.**

Stems terete or very obscurely 5-angled, striate, copiously cinereous-puberulent with tawny hairs; leaves numerous, approximate; stipules linear, falcate, 10 mm. long, 0.75 mm. wide, green, nerved, subulate-tipped, cinereous-puberulent; rachis of the leaf about 35 mm. long, tipped with a subulate appendage 3 mm. long, the lower pair of leaflets borne 20 to 25 mm. above the base; petiolar glands 2, one or rarely 2 glands borne between each pair of leaflets, 2 to 3 mm. long, slender-cylindric or rarely conic, acute, black; leaflets 2 pairs, asymmetrical, oblong-obovate to elliptic-oblong, 5 to 8 cm. long, 2 to 4 cm. wide, abruptly long-acuminate at the apex, the tip acute, 14 mm. long or less, obtuse or rounded and unequal at the base, firm in texture, subcoriaceous, glabrous, lustrous on the upper surface, concolorous, conspicuously veined; inflorescence a dense many-flowered leafy terminal panicle, its branches densely cinereous-puberulent with yellow hairs; peduncles rather stout, 7 to 18 mm. long; bracts similar to the stipules but shorter and thinner, some of them narrowly linear-lanceolate and not falcate; sepals subequal, 4 mm. long, oblong-ovate, obtuse, densely pubescent with short appressed curved yellow hairs; petals bright yellow, about 13 mm. long, oblong or oblong-oblong, obtuse, clawed, abundantly cinereous on the outer surface; anthers glabrous, nearly equal, the 3 lower slightly beaked; ovary strongly curved, densely covered with appressed yellowish hairs.

Type in the U. S. National Herbarium, no. 715333, collected in the vicinity of San Felix, eastern Chiriquí, Panama, altitude 120 meters or less, December, 1911, by H. Pittier (no. 5147).

Closely related to *Cassia undulata*, but distinguished readily by the narrower stipules and bracts and by the broader, abruptly acuminate leaflets. In that species the stipules are more than 2 mm. wide and the bracts of the inflorescence oblong-lanceolate to oval, while the leaflets are acute or abruptly acute.

***Cassia caudata* Standley, sp. nov.**

Mature stems not seen, the young ones slender, terete, glabrous; rachis of the leaves terete, striate, 15 to 19 cm. long, the lower pair of leaflets borne 9 to 12 cm. above the base; stipules not seen; petiolar gland one, 2.5 mm. long, obtusely conic, borne between the lower pair of leaflets; petiolules stout, about 5 mm. long; leaflets 2 pairs, elliptic-oblong to ovate, 13 to 21 cm. long, 7 to 9 cm. wide, obtuse or rounded at the base and slightly unequal, acutish at the apex and abruptly contracted into an acute caudate tip 15 to 30 mm. long, thin, glabrous, bright green on the upper surface but not lustrous, decidedly paler beneath; leaflets of the lower pair shorter and broader than those of the upper; inflorescence of axillary several-flowered racemes or panicles about 7 cm. long, the branches appressed-puberulent with yellowish hairs; bracts linear-subulate, 3 mm. long; pedicels ascending, 15 to 20 mm. long; calyx lobes unequal, 4 to 7 mm. long, obtuse, sparingly puberulent, green; petals bright yellow with dark veins, about 20 mm. long, 12 mm. wide or less, rounded at the apex, conspicuously clawed; anthers glabrous, slightly unequal, the 3 lower with short cylindric beaks; ovary terete, densely appressed-pubescent.

Type in the U. S. National Herbarium, no. 679652, collected in forests of the upper Mamóní River, Province of Panama, Panama, altitude 150 to 400 meters, October, 1911, by H. Pittier (no. 4491).

In Bentham's revision of the genus this falls into the section *Chamaefistula*, series *Bacillares*.¹ It is related to *Cassia bacillaris* and *C. inaequilatera*, but from these and their allies it differs in having long-caudate leaflets. From each species it differs also in various minor respects.

Cassia regia Standley, sp. nov.

Tree; older branches blackish gray, slightly furrowed; young branches succulent, obtusely 5-angled, densely velvety-pubescent with short yellowish hairs; stipules linear-subulate, 2 mm. long, early deciduous; rachis of the leaf about 30 cm. long, the lowest pair of leaflets borne 2 cm. above its base, densely velvety-pubescent; petiolar glands none; leaflets about 20 pairs, approximate, narrowly oblong, 26 to 60 mm. long, 10 to 16 mm. wide, the lower and the uppermost shorter than those along the middle of the rachis, all acute, or the lower obtuse, apiculate, slightly unequal at the base and from truncate to acute, lustrous on the upper surface, conspicuously veined, and furnished with numerous fine short stiff appressed hairs, beneath slightly paler, with sparse, short, spreading or appressed hairs, more prominently veined than on the upper surface; petiolules very thick, about 1 mm. long; inflorescence of numerous slender, solitary or clustered racemes 10 to 16 mm. long, borne on the old branches, densely velvety-pubescent with short hairs; bracts subulate, small, deciduous before anthesis; pedicels ascending, 14 to 18 mm. long; sepals subequal, 7 mm. long, 4 mm. wide, oval-oblong, rounded at the apex, purple, with rather few minute appressed hairs; petals 12 mm. long, 8 mm. wide, orbicular-oval or broadly obovate, rounded at the apex, contracted at the base into a slender claw, pale yellow with conspicuous purple veins, glabrous; anthers 2 mm. long, sparingly pilose, the lobes smooth; ovary strongly curved, densely covered with appressed whitish hairs.

Type in the U. S. National Herbarium, no. 677196, collected around El Paraíso, Canal Zone, Panama, altitude 30 to 100 meters, January 24, 1911, by H. Pittier (no. 2532). Additional material is mounted on sheet 677197.

Similar to *Cassia grandis*, but readily distinguished by its purple, sparingly pubescent sepals, and by its acute leaflets. The pubescence of the leaflets is much less abundant than in *C. grandis*, where it might be called tomentose. Specimens of the two species are very unlike in general appearance.

Chamaecrista simplex Standley, sp. nov.

Annual; stems erect, very slender, simple or with a few erect branches above, sparingly cinereous below, densely so above; leaves few and distant; stipules narrowly linear-lanceolate, 10 to 13 mm. long, attenuate, aristate-tipped, appressed, strongly nerved, ciliate; rachis of the leaf 65 to 80 mm. long, bearing leaflets to within 3 or 4 mm. of the base; petiolar gland sessile, cup-shaped, inserted just below the lowest pair of leaflets; leaflets 18 to 25 pairs, oblong or linear-oblong, 5 to 7 mm. long, about 1.5 mm. wide, acutish, mucronate, very oblique at the base, glabrous, ciliate, rather thick and subcoriaceous, very prominently pinnate-nerved, the midvein excentric; flowers few in each cluster, on pedicels 3 mm. long or less, the bracts similar to the stipules but smaller and broader; sepals lanceolate, 5 mm. long, acute or acuminate, appressed, pubescent; petals about 6 mm. long; legumes erect, 35 to 40 mm. long, 4 mm. wide, obtuse, short-beaked, abundantly hirtellous.

Type in the U. S. National Herbarium, no. 679815, collected in the Sabana de Dormisolo, near Chepo, Province of Panama, Panama, at an altitude of 60 to 80 meters, October, 1911, by H. Pittier (no. 4655).

¹ Trans. Linn. Soc. Bot. 27: 519. 1871.

Related, perhaps, to *C. patellaria*, which it resembles in the sessile petiolar glands, but from which it differs conspicuously enough in the slender, simple or nearly simple stems with appressed pubescence, and in the small, subcoriaceous leaflets which are very oblique at the base.

***Chamaecrista stenocarpa* (Vog.) Standley.**

Cassia stenocarpa Vog. Gen. Cass. Syn. 68. 1837.

***Chamaecrista tagera* (L.) Standley.**

Cassia tagera L. Sp. Pl. 538. 1753.

NEW OR NOTABLE MIMOSACEAE FROM PANAMA.

This characteristically tropical family is well represented in Panama by both herbaceous and woody forms. A new species each of *Calliandra*, *Morongia*, and *Mimosa* is described here. An old subspecies of *Mimosa* published by Benthham appears to deserve specific rank and is redescribed.

***Calliandra pittieri* Standley, sp. nov.**

A tree with a flat crown; branches grayish or yellowish green, smooth, the younger ones puberulent and sparingly appressed-pilose with tawny hairs; stipules persistent, linear-lanceolate, acute, 3 mm. long, ciliolate, slightly puberulent; rachis of the leaf 45 to 105 mm. long, slender, densely cinereous-puberulent; pinnae 7 to 11 pairs, 20 to 55 mm. long; leaflets 20 to 65 pairs, linear or oblong-linear, 3 to 5 mm. long, less than 1 mm. wide, acute to obtuse, minutely scabrous-ciliolate with a few longer hairs interspersed, otherwise glabrous, rather prominently veined, the midvein nearly central, pale green, lustrous on the upper surface; inflorescence axillary, the solitary or clustered peduncles slender or stout, 15 to 45 mm. long, sparingly puberulent; flowers rather few in each head, sessile; calyx 1.25 mm. long, campanulate, glabrous or obscurely puberulent, the teeth very short and separated by broad sinuses; corolla short-funnelform, 5 to 6 mm. long, sparingly short-puberulent or appressed-pilose, the lobes oblong-lanceolate, obtuse; stamens pink, about 3 cm. long; fruit densely pubescent with short yellow hairs, the margins very thick, the valves coriaceous (only imperfect specimens seen).

Type in the U. S. National Herbarium, no. 531146, collected at La Esmeralda, near Jamundí, Cauca Valley, State of Cauca, Colombia, at an altitude of 1,200 meters, January, 1905, by H. Pittier (no. 951).

Apparently the same is a specimen in flower, collected near Cana, Panama, in 1908 by R. S. Williams (no. 707). This is from a small tree nearly 5 meters high, with a trunk 10 cm. in diameter. The Panama plant has slightly smaller and more obtuse leaflets than the type, but seems not to differ otherwise.

The proposed species is related to *Calliandra purdiaei* Benth., but differs in having much smaller flowers as well as more numerous and smaller leaflets.

***Mimosa panamensis* (Benth.) Standley.**

Mimosa debilis panamensis Benth. Trans. Linn. Soc. Bot. 30: 391. 1875.

Stems slender, prostrate, sparingly setose-hirsute, abundantly armed with stout recurved spines 4 mm. long or less; stipules linear, rigid, 4 mm. long, strongly nerved, pectinate-ciliate; petioles 15 to 25 mm. long, sparingly setose and bearing a few very slender spines; pinnae a single pair, each consisting of 2 pairs of leaflets, the inner leaflet of the lower pair much reduced; leaflets oblong-obovate, 8 to 18 mm. long, 4 to 7 mm. wide, very unequal at the base, but the midvein only slightly excentric, from rounded to acutish at the apex, mucronate, short-strigose on the upper surface, beneath more densely strigose; peduncles slender, 12 to 35 mm. long, glabrous; bracts

of the capitate inflorescence linear, subulate-tipped, pectinate-ciliate, inconspicuous; corolla puberulent, not striate; stamens 5, 6 mm. long; corolla puberulent, not striate; legumes narrowly oblong, 16 mm. long or less, 3 mm. wide, acute, short-beaked, acute at the base and nearly sessile, densely spiny-hispid, the slender spines 2 to 3 mm. long.

TYPE LOCALITY: Panama, in meadows near the town of Nata; type collected by Seemann (no. 98).

SPECIMENS EXAMINED:

PANAMA: Aguadulce, Province of Coclé, in savannas, near sea level, *Pittier* 4952. Ancón Hill, *Brother Celestine* 66.

This seems worthy of specific rank, differing from *Mimosa debilis* in its numerous spines, broader stipules, and narrow leaflets.

Known in Panama as "dormidera de escobilla" and "ciérrate de escobilla" (Brother Celestine).

***Mimosa williamsii* Standley, sp. nov.**

A slender vine with trailing stems 2 meters long or more; branches terete, green-glabrate or very sparsely retrorse-strigose, unarmed, or with a very few short slender spines; stipules linear, acuminate, 3 to 4 mm. long, rigid, erect, canescent, pectinate, ciliate; petioles slender, 35 to 60 mm. long, tipped with a subulate appendage 4 to 7 mm. long, retrorsely strigose and puberulent, each bearing 1 or 2 slender recurved spines 1.5 mm. long; pinnae 1 pair, divergent, their rachises 15 to 20 mm. long; leaflets 2 pairs on each rachis, the inner one of the lower pair usually much reduced and not more than one-fifth the length of the others; leaflets elliptic-oblong to oblong-ob lanceolate, very unequal at the base, the midvein strongly excentric, acutish, abruptly contracted into a mucro 1.5 mm. long, setose-strigose on the upper surface and with numerous very slender soft white hairs, beneath densely strigose; peduncles slender, 15 to 32 mm. long, glabrous or nearly so, ascending or recurved; bracts of the capitate inflorescence linear, with subulate tips, scarcely equaling the corollas; corolla about 2 mm. long, glabrous, not striate; stamens 5; fruit oblong or oval, 8 to 20 mm. long, about 7 mm. wide, obtuse or abruptly acute at the apex and bearing a subulate tip 2 mm. long, contracted at the base into a stipe 3 to 4 mm. long, 1 to 3-seeded, the valves plane, articulate, abundantly setose-strigose and cinereous-puberulent.

Type in the U. S. National Herbarium, no. 677919, collected in the vicinity of Penonomé, Panama, February or March, 1908, by R. S. Williams (no. 101).

Most closely related to *Mimosa albida*, but differing conspicuously in its prominently stipitate, short, few-seeded fruit, sparse, retrorse-strigose pubescence, and glabrous corolla.

***Morongia pilosa* Standley, sp. nov.**

Stems prostrate, stout, sharply 5-angled, green, copiously pilose with slender white hairs, armed on the angles with numerous slender recurved spines 2 mm. long; stipules setaceous, erect, 3 mm. long; petioles 35 to 80 mm. long, slender, pilose, closely beset with rather stout recurved spines, bearing 5 to 7 closely approximate pairs of pinnae; rachises of the pinnae 12 to 25 mm. long; leaflets 11 to 22 pairs, the lowest pair borne almost at the base of the rachis, linear-oblong, 3.5 mm. long, hardly 1 mm. wide, thin, smooth, appressed-pilose, obtuse, oblique at the base, sessile; peduncles 5 to 8 mm. long, rather stout, villous, bearing numerous short recurved spines, solitary or 2 together, axillary or racemose at the ends of the branches; heads of flowers small, 3 to 4 mm. in diameter exclusive of the stamens; bracts linear, setaceous-tipped, pilose-ciliate; corolla glabrous, short-stipitate; stamens pink, exerted 3 to 4 mm.; mature fruit not seen, the slightly developed ovaries 4-angled, glabrous on the faces and smooth, densely setose-hispid on the angles.

Type in the U. S. National Herbarium, no. 679704, collected along the Camino del Boticario, near Chepo, Province of Panama, Panama, altitude 30 to 50 meters, October, 1911, by H. Pittier (no. 4544).

Related to *Morongia distachya* (DC.) Cook & Collins, a species of southern Mexico, but differing in its numerous short, approximate pinnae, which are leaflet-bearing nearly to the base, its pilose stems, and its smaller heads of flowers, these supported on shorter peduncles.

NEW PANAMANIAN FABACEAE.

During the study of the herbaceous representatives of this family collected in Panama by Mr. Pittier there have been discovered specimens of several South American species not hitherto known from North America. It is expected that an account of these will be published later. New species of several genera have also been detected, diagnoses of which are published here.

***Bradburya heteroneura* Standley, sp. nov.**

Perennial vine with slender prostrate or climbing stems, these pubescent with short white slender hairs or glabrate; stipules lanceolate or lance-ovate, acuminate, 3 to 4 mm. long, closely parallel-nerved, glabrous; petioles 6 to 25 mm. long, puberulent or soft-pubescent or glabrate; petiolules 1 to 1.5 mm. long; stipellae subulate, 2 to 3 mm. long; leaves pinnately trifoliolate, the leaflets lanceolate to narrowly oblong-lanceolate, 22 to 45 mm. long, 4 to 11 mm. wide, acute or obtuse, mucronulate, rounded or subcordate at the base, thick and somewhat coriaceous, bright green, scaberulous on the upper surface, glabrous beneath, the prominent veins much reticulated, 8 to 12 of the lateral ones much more conspicuous than the others, diverging from the midvein at an acute angle and anastomosing near the margin; peduncles short, axillary, 7 mm. long or less, 1 or 2-flowered, white-villous; pedicels glabrous, about 7 mm. long, the bracts at their base 6 to 7 mm. long, broadly ovate, deeply cordate-clasping; bracts at the base of the calyx ovate, inequilateral, 15 mm. long, acute, finely parallel-nerved, finely pubescent on the outer surface, twice as long as the calyx or more; calyx broadly campanulate, thin, pale, the upper lobes almost wanting, the margin appearing undulate, the lower lobe linear, equaling or exceeding the tube, finely villous; flowers blue, the standard with a yellowish spot; standard 25 to 30 mm. long and of the same breadth, the upper edge nearly straight, finely soft-pubescent outside; keel and wings 15 to 20 mm. long; young fruit linear, long-beaked, glabrous, the margins much thickened.

Type in the U. S. National Herbarium, no. 678060, collected near Penonomé, Panama, February or March, 1908, by R. S. Williams (no. 328).

This is most nearly related to *Bradburya angustifolia*. The venation of the leaves is very different in *B. heteroneura* and the bracts are pubescent instead of glabrous.

***Canavalia bicarinata* Standley, sp. nov.**

Slender vine with purplish flowers; young stems finely tomentose with tawny hairs, the older ones glabrate; stipules small, linear-subulate, deciduous; petioles stout, 15 to 55 mm. long, finely tomentose or in age glabrate; stipellae deciduous; petiolules 3 mm. long, densely pubescent with tawny hairs; leaflets ovate to ovate-oblong or elliptic-ovate, abruptly short-acuminate, the tip obtuse or emarginate, rounded to cordate at the base, dull green, thick and subcoriaceous, prominently veined, finely soft-pubescent on the upper surface, becoming glabrate, beneath sparingly pubescent with mostly appressed hairs; racemes 11 to 27 cm. long, rather slender, the rachises finely appressed-pubescent or glabrate, conspicuously nodulose, with numerous somewhat remote flowers; bracts and bractlets much shorter than the calyx, broadly ovate, obtuse or acutish, conspicuously parallel-nerved, glabrous but ciliolate; pedicels very

short and thick, scarcely more than 1 mm. long; calyx tubular-campanulate, 12 mm. long, the lobes short, the upper broad and truncate, the lower smaller, ovate, obtuse, the whole green, appressed-pubescent; corolla about 25 mm. long, the banner emarginate, the keel and wings of about the same length, the keel very narrow, strongly incurved; legumes oblong-linear, 11 to 14 cm. long, 15 to 18 mm. wide, densely sericeous with short white hairs; valves keeled along the sutures, and each with 2 longitudinal keels 1 to 2 mm. high, these about equidistant from the margins and from each other; seeds numerous, oval-oblong, 9 mm. long, flattened laterally, dark brownish or greenish black, more or less splotched with a lighter tint.

Type in the U. S. National Herbarium, no. 676590, collected in clearings around Alhajuela, Province of Panama, Panama, altitude 30 to 100 meters, January 11 or 12, 1911, by H. Pittier (no. 2354).

ADDITIONAL SPECIMENS EXAMINED:

PANAMA: Vicinity of Penonomé, *Williams* 132.

COSTA RICA: Nicoya, *Pittier*.

Readily distinguished from the other Panamanian species by the 2 keels of each valve of the legume. The only other species with similar fruit is *Canavalia acuminata* Rose,¹ which has larger legumes, differently shaped seeds, and thin, glabrous leaflets of very different outline. That species is known only from Manzanillo, Mexico.

Dolicholus angulatus Standley, sp. nov.

Stems twining, the young ones stout, sharply 3-angled, very densely tomentose with short, soft, straight, whitish or tawny hairs; stipules persistent, large, 7 to 15 mm. long, ovate or oblong-ovate, rounded to rather obtuse, sessile, foliaceous, finely parallel-nerved, densely tomentose; petioles stout, angled, densely villous or tomentose, 4 to 6 cm. long; petiolules very stout, about 4 mm. long; stipellæ subulate, equaling the petiolules; leaflets broadly ovate or rounded-ovate, 35 to 80 mm. long, abruptly short-pointed, entire, rounded at the base, bright green, abundantly sericeous on the upper surface, beneath densely soft-pubescent and sparingly gland-dotted, the terminal leaflet larger than the lateral ones, the latter somewhat inequilateral; racemes rather slender, 10 to 15 cm. long, the rachises angled, tomentose, the flowers numerous, sometimes remote and subverticillate; bracts soon deciduous, lanceolate or lance-oval, abruptly long-acuminate, shorter than the calyx; pedicels stout, very short, 1 to 2 mm. long; calyx 1 cm. long, slightly accrescent in age, the lobes several times longer than the very short tube, subequal, lanceolate, acuminate, 3 mm. wide or less, glabrous or sparingly pubescent within, densely tomentose outside, conspicuously pinnate-nerved; corolla yellow, slightly shorter than the calyx; standard ovate, rounded at the apex, short-clawed, with very small rounded auricles, glabrous; wings and keel of about the same length as the standard, the keel somewhat incurved; mature fruit not seen, the very young legume densely pubescent along the margins, gland-dotted, 2-ovuled.

Type in the U. S. National Herbarium, no. 676693, collected along the railroad between Miraflores and Pedro Miguel, Canal Zone, Panama, altitude 30 to 50 meters, January 21, 1911, by H. Pittier (no. 2510).

This is related to *D. reticulatus*, but differs conspicuously in the large, persistent stipules, the glabrous banner, and the broader calyx lobes.

Dolicholus ixodes Standley, sp. nov.

Perennial from a slender or sometimes woody root; stems rather stout, terete, erect or twining, densely glandular-hirsutulous; stipules lanceolate, 4 to 5 mm. long, acute, rather persistent, brown, with few parallel nerves, sparingly pubescent; petioles slender, 12 to 18 mm. long, densely viscid-hirsutulous and glandular; petiolules about 1 mm. long; leaflets ovate-triangular, 10 to 25 mm. long, 11 to 20 mm. broad, acute or

¹ Contr. U. S. Nat. Herb. 1: 322. 1895.

abruptly acute, broadly rounded or truncate at the base, prominently veined, dull green, densely viscid-pubescent on both surfaces; racemes axillary, 3 to 11 cm. long, with 3 to 7 flowers near the apex, the rachis pubescent like the stems; bracts shorter than the calyx, inconspicuous; pedicels 2 to 4 mm. long; calyx about 5 mm. long, the lobes about twice as long as the campanulate tube, subequal, the lowest slightly longer than the others, all linear or linear-lanceolate, attenuate, densely viscid-hirsute with tawny hairs; corolla 8 to 9 mm. long, reddish brown, the banner broadly oblong, viscid-pubescent outside, the keel and wings of about the same length; legumes about 16 mm. long, elliptic-oblong, acutish, sessile, viscid-hirsute with yellow hairs and glandular, short-beaked; seeds 2, 3.5 mm. long, flattened, dark reddish brown.

Type in the U. S. National Herbarium, no. 677931, collected in the vicinity of Penonomé, Panama, in February or March, 1908, by R. S. Williams (no. 119). The same collector's no. 581, from the vicinity of Penonomé, also belongs here.

The plant is related to *D. phaseoloides*, but differs widely in its lesser stature, small leaflets, dense, viscid pubescence, few-flowered racemes, and pubescent legumes which are not constricted between the seeds.

Dolicholus calycosus (Hemsl.) Standley.

Rhynchosia calycosa Hemsl. Diag. Pl. Mex. 48. 1880.

Erythrina darienensis Standley, sp. nov.

Petioles somewhat fleshy, 10 to 13 cm. long, sparingly and minutely puberulent, bearing a large (4 mm. high) cuplike gland at the base of each lateral leaflet; leaflets thin, bright green, glabrous, or sparingly puberulent upon the veins beneath, the terminal ones 15 to 16 cm. long and of the same breadth, rhombic-ovate, obtuse but abruptly short-pointed, broadly rounded at the base; lateral leaflets similar in outline to the terminal one but inequilateral and smaller, 13 to 14 cm. long; petiolules stout, 1 cm. long; inflorescence of stout racemes 8 to 19 cm. long aggregated at the ends of the branches, their rachises densely and very finely tomentulose with tawny hairs; pedicels stout, divergent, 5 mm. long or less; calyx campanulate, 7 mm. long, 5 to 6 mm. broad, contracted into a short stipelike base, truncate at the top and entire except for a very short triangular lower tooth, minutely tomentulose-puberulent; banner recurved, about 45 mm. long and 15 mm. wide, elliptic, obtuse, sessile, glabrous; keel 35 mm. long, falcate, obtuse or acutish, the petals 10 mm. wide near the base, united for nearly their whole length; wings rhombic-oval, obtuse, 10 mm. long; stamens 10, the filaments of 9 of them united nearly to the top, that of the tenth free nearly to the base; ovary long-stipitate, tomentulose.

Type in the U. S. National Herbarium, no. 715845, collected near Boca de Pauarandó, on the Sambú River, southern Darién, Panama, at an altitude of about 20 meters, February, 1912, by H. Pittier (no. 5578).

Distinguished from the South American species with united keel petals by the narrow standard. The glands of the petioles seem to be peculiar to this plant.

Erythrina darienensis is a characteristic tree of the flats along the Sambú River, attaining a height of 30 meters. The straight trunk is 1.2 meters in diameter, with grayish bark, supported at the base by "saponemas" or buttresses. The wood is soft and white. The young branches are armed with short spines.

Meibomia maxonii Standley, sp. nov.

Section Chalarium. Much branched shrub about 2 meters high; stems stout, brown, terete, the younger ones densely hirsute with white hairs, the older ones becoming glabrate; stipules distinct, persistent, broadly lanceolate to broadly ovate, 5 to 8 mm. long, abruptly long-acuminate, finely parallel-nerved, brown, thin, glabrous within, densely and coarsely sericeous on the outer surface; petioles 10 to 22 mm. long, hirsute; leaflets ovate to oblong or oval, 20 to 38 mm. long, 11 to 23 mm. wide, obtuse to acutish, rounded at the base, thick, dull green, conspicuously reticulate-veined, sparingly pubescent on the upper surface with short, closely appressed hairs, or glabrate,

beneath abundantly hirsute with soft white or tawny hairs; inflorescence consisting of numerous short-peduncled terminal racemes, these 4 to 8 cm. long, loosely many-flowered, the rachises abundantly hirtellous with tawny hooked hairs; bracts similar in form and pubescence to the stipules, large, conspicuous before anthesis, early deciduous; pedicels slender, ascending, about 10 mm. long; calyx 3 mm. long, purplish, hirsute, the upper lobe triangular-ovate, acutish; corolla 10 mm. long, bright deep purple; loment short-stipitate, the stipe slightly shorter than the calyx; joints 4 to 6, 4 to 4.5 mm. long, with a central isthmus, rhombic-oval, with more or less contorted edges, thick and turgid, obscurely reticulate, sparingly uncinatopuberulent.

Type in the U. S. National Herbarium, no. 675728, collected on open, brushy, steep slopes, Cuesta de Cerro Quemado, eastern slope of Chiriquí Volcano, Panama, altitude 1,900 meters, March 11, 1911, by William R. Maxon (no. 5370). Additional material is mounted on sheet 675727.

Also collected by Mr. H. Pittier at the same place on the same date (no. 3112).

A most distinct member of the section *Chalarium*, readily distinguished from the other shrubby species by the abundant, white, hirsute pubescence, the large, deep purple flowers, and the rhombic, contorted joints of the loment.

***Phaseolus chiriquinus* Standley, sp. nov.**

Stems stout, striate-angled, sparingly pubescent with short, fine, straight or curled, whitish hairs, or glabrous; stipules triangular-lanceolate, acute, small, thin, brownish; petioles stout, 25 to 40 mm. long, hirtellous; petiolules thick, 3 to 4 mm. long, tawny-villous or hirtellous; stipellæ 1.5 to 2 mm. long, ovate to oblong-linear, acutish, 1-nerved; leaflets ovate to oblong-ovate, 4 to 7 cm. long, 4.5 cm. wide, acute or abruptly short-acuminate, rounded at the base, prominently veined, pubescent on the upper surface with fine spreading hairs, beneath sericeous with tawny hairs; racemes 10 to 38 cm. long, much exceeding the leaves, the rachis stout, obtusely angled, hirtellous with tawny hairs, glabrate below, the flowers very numerous, in fascicles of 2 to 5; bracts linear, acute, 4 to 6 mm. long, appressed-pubescent, somewhat persistent; pedicels slender, 4 to 9 mm. long, ascending; calyx campanulate, 3 to 4 mm. long, copiously pubescent with short tawny hairs, the lobes shorter than the tube, the upper one broad and low, emarginate, the 3 lower ones ovate, acutish, slightly longer, the mouth of the calyx very oblique; bractlets very small, much shorter than the calyx; banner purple, the wings and keel pale yellowish, more or less tinged with purple; banner about 14 mm. long and 12 mm. wide, rounded-obovate, recurved, deeply emarginate, glabrous, narrowed at the base and with a rounded auricle on each side, this folded over against the inner surface, glabrous; wings narrow, about equaling the banner, with a rounded auricle at the base; keel strongly spirally coiled; young legumes flat, broadly falcate, about 3 times as long as broad, mostly 4-ovuled, very densely pubescent with loose tawny hairs.

Type in the U. S. National Herbarium, no. 677501, collected on the Cuesta de Cerro Quemado, eastern slope of Chiriquí Volcano, Panama, altitude 1,800 to 2,160 meters, March 10 to 13, 1911, by H. Pittier (no. 3111).

From the form of the fruit, this plant evidently belongs to the group *Drepanospron*. It is related to *Phaseolus multiflorus* Willd., but differs in its more elongate inflorescence, numerous flowers, shorter pedicels, and small, deciduous bractlets.

NEW OR NOTABLE SPECIES OF GERANIUM FROM COLOMBIA AND VENEZUELA.

In a large collection of plants secured in Venezuela by Dr. Alfredo Jahn there are specimens of several species of *Geranium*. One of these is apparently new, while a second has been known previously only from the type collection. In 1906 Mr. Pittier obtained in Colombia specimens of another *Geranium* which can not be referred to any published species.

Geranium stoloniferum Standley, sp. nov.

Perennial from a thickened caudex covered by the persistent imbricated stipules and petiole bases; plants producing long slender prostrate branches 30 to 50 cm. long, these rooting at the nodes and forming there thick caudices similar to the basal ones; stems slender, puberulent and bearing numerous somewhat retrose or spreading, subhispid hairs, the tips of the branches ascending, the internodes 2.5 to 15 cm. long; leaves numerous, usually densely clustered at each node; stipules lanceolate, attenuate into a long subulate tip, 6 to 20 mm. long, dark brown to nearly black, puberulent on the outer surface; petioles slender, those of the basal leaves 5 to 8 cm. long, several times as long as the blades, those of the upper cauline leaves mostly shorter than the blades and only 2 to 10 mm. long; leaf blades rounded to subreniform in outline, 10 to 28 mm. broad, thick and firm, yellowish green, prominently veined, at first sparsely hispidulous on the upper surface but soon glabrate, abundantly hispidulous beneath along the veins and the revolute margins, the blades 5-cleft (or the smaller ones only 3-cleft) about three-fifths the distance to the base, the divisions broadly obovate to cuneate in outline, very shallowly 3-lobed at the apex, the lobes obtuse to broadly rounded, the divisions of the smaller leaves sometimes entire; peduncles usually 2-flowered, about 15 mm. long, much longer than the subtending leaves, densely pilose with spreading whitish hairs and somewhat villous; bracts 4 to 5 mm. long, lanceolate, attenuate to a subulate tip; pedicels slender, 8 to 25 mm. long, densely pilose with spreading gland-tipped hairs; sepals 5 mm. long, narrowly oblong or elliptic-oblong, acutish, short-mucronate, pilose with spreading, often gland-tipped hairs; petals 1 cm. long, broadly cuneate-spatulate to obovate, shallowly emarginate, nearly glabrous; fruit not seen.

Type in the U. S. National Herbarium, no. 602320, collected in the Páramo de la Cristalina, State of Trujillo, Venezuela, at an altitude of 2,900 meters, December 20, 1910, by Dr. Alfredo Jahn (no. 126).

It is not possible to determine with certainty the color of the petals, since they are discolored, but they appear to have been white or pink. Apparently of the same species is a specimen from the Páramo de Timotes, State of Táchira, collected at an altitude of 3,000 to 3,500 meters, in March, 1910, by Doctor Jahn (no. 164). This is a mere fragment, but it agrees in the form of the leaves and flowers.

The proposed species belongs to the section *Diffusa*, as outlined by Dr. R. Knuth.¹ It differs from most of the species of that section in its peculiar habit, bracteate 2-flowered peduncles, and revolute leaf margins. It is most closely related to *Geranium diffusum* H. B. K., a plant with ascending or nearly erect stems, mostly shorter petioles, much shorter stipules (3 to 4 mm. long), and petals only 7 mm. long. It is also related to two Venezuelan species, *G. lindenianum* Turcz. and *G. subnudicaule* Turcz., but both these are of different habit and have incised leaf divisions.

¹ In Engl. *Pflanzenreich* 53: 209. 1912.

Geranium velutinum Turcz. Bull. Soc. Nat. Moscou 31¹: 417. 1858.

Specimens agreeing very well with the original description of this species were collected in the Páramo de Timotes, State of Táchira, Venezuela, at an altitude of 3,000 to 3,500 meters, in March, 1910, by Dr. Alfredo Jahn (no. 5). The type was collected by Funck and Schlim (no. 1251) in the Páramo de Portechuelo, State of Mérida, Venezuela, at an altitude of 2,500 to 2,700 meters. Knuth, in his monograph of the genus, places the species doubtfully in the section *Gracilia*.¹ If the present specimen is correctly determined, the species can be better placed in some other section.

Geranium confertum Standley, sp. nov.

Plant perennial, densely caespitose with much thickened caudices from a stout elongate frutescent root; leaves and flowers all basal; stipules 10 to 15 mm. long, scarious, stramineous, ovate or oblong-ovate, attenuate to a filiform tip, glabrous or nearly so; petioles stout, 1.5 to 5 cm. long, densely pilose with short, spreading or retrorse hairs, slightly viscid; leaf blades rotund in outline, 1 to 2 cm. wide, cleft three-fifths the distance to the base into 5 or 7 broadly cuneate divisions, these 3-lobed at the apex, the lobes ovate to oval, rounded at the apex, the whole blade firm and subcoriaceous, dull green, prominently veined, sparsely pubescent on the upper surface with slender appressed hairs, glabrate in age, abundantly pilose beneath along the veins with spreading hairs; flowers very numerous, the peduncles 1-flowered, ebracteate, 15 to 20 mm. long, densely pilose with spreading or retrorse white hairs; sepals 7 to 8 mm. long, oblong-linear or lance-linear, acute, short-mucronate, pilose-ciliate, especially near the base, sparsely pilose; petals purplish pink, 12 to 15 mm. long, narrowly spatulate, rounded at the apex, glabrous; fruit about 9 mm. long, the valves and beak densely pubescent with short stiff spreading hairs.

Type in the U. S. National Herbarium, no. 531305, collected in the Páramo de Buena Vista, Huila Group, Central Cordillera, State of Cauca, Colombia, at an altitude of 3,000 to 3,600 meters, January, 1906, by H. Pittier (no. 1107).

A member of the section *Andina* proposed by Knuth² and most nearly related to *Geranium sessiliflorum* Cav., a species which ranges in the Andes from Bolivia to Patagonia. In the U. S. National Herbarium there are several collections of that species, some of which are cited by Knuth. *Geranium sessiliflorum* is similar in habit to the species here described, but it has mostly appressed pubescence, thin and more deeply parted leaves, densely hirsute, smaller sepals (only 4 to 5 mm. long), and smaller, white petals.

WERCKLEA, A NEW GENUS OF MALVACEAE.

The tree here described was first discovered by Mr. Pittier in 1898 at a time when he was unable to collect specimens of it. Later, material was secured under his direction, which is the basis of the description here published. It is one of the most showy members of the Malvaceae, the flowers equaling in size those of any species of *Hibiscus* and being borne in great profusion. Very few, if any, of the arborescent members of that genus reach so large a size.

¹ In Engl. Pflanzenreich 53: 104. 1912.

² In Engl. Pflanzenreich 53: 78. 1912.

WERCKLEA Pitt. & Standl., gen. nov.

A tree of medium size; leaves alternate, long-petioled, the blades broadly rounded, entire or repand-undulate, palmately nerved; stipules broad and foliaceous; pubescence sparse, of short stellate hairs; flowers solitary in the axils, long-peduncled; involucre tubular-campanulate, shallowly 3-lobed, usually split nearly to the base on one side by the developing flower; calyx narrowly campanulate, 5-lobed to about the middle, the lobes acute, 3-nerved; petals 5, united for a short distance at the base with each other and with the stamen tube, spatulate-oblongate, somewhat clawed, palmately nerved; stamen tube striate, one-third as long as the petals, antheriferous for half or two-thirds its length, shallowly 5-lobed at the summit; anthers oblong, longitudinally dehiscent; ovary sessile, 5-celled; ovules pendulous, numerous in each cell, amphitropous; style filiform, striate, with 5 ascending branches; stigmas capitate or fimbriate; capsule oblong, with a long stout beak at the apex, broadly winged along the sutures by the well developed exocarp; seeds ovoid-reniform, hispid.

Wercklea is a member of the subfamily Hibisceae, and is most closely related to the genus Hibiscus. Several important points of difference, however, make it unwise to refer it to that genus. The involucre is merely 3-lobed before anthesis, while in all species of Hibiscus the bracts are separate. Paritium, sometimes referred to Hibiscus, has united bracts, but they are 5 instead of 3. The winged capsule, oblong anthers, and comparatively few stamens are other distinguishing features, but the best, perhaps, is the fact that the ovules are amphitropous rather than anatropous.

The genus is named for Mr. C. Wercklé, the collector of the type, who has botanized extensively in little known regions of Central America and Colombia.

Wercklea insignis Pitt. & Standl., sp. nov.

A tree 9 to 10 meters high with a trunk 30 to 40 cm. in diameter and a rounded top; young branches stout and succulent, sparingly pubescent with whitish stellate hairs; stipules foliaceous, orbicular or broader to obovate or oblong, sessile by a broad base, entire; petioles 6 to 32 cm. long; leaf blades reniform-orbicular, 15 to 40 cm. broad, entire or repand-undulate, bright green, with a few scattered stellate hairs on the upper surface and more numerous ones beneath, the principal veins usually 7; peduncles stout, 5 to 14 cm. long, stellate-pubescent at anthesis but soon glabrate; involucre monophyllous, 14 to 20 mm. long, 3-lobed, the sinuses often very shallow but sometimes extending nearly to the base, the lobes obtuse or rounded, sparingly stellate-pubescent, cleft almost half way to the base; calyx lobes triangular or triangular-ovate, acute; corolla about 12 cm. long and of the same breadth; petals spatulate-oblongate, obtuse to truncate at the apex, entire, lilac rose, yellow at the base, sparingly pilose; capsule oblong, 5 cm. long, with a stout beak 10 to 12 mm. long, densely hispid, glabrous within, with thin double wings along the angles, these dividing with the dehiscence of the capsule; seeds 3 mm. long, dark brown, densely covered with stiff tawny hairs about 3 mm. long.

Type in the U. S. National Herbarium, no. 678449, collected in the forests near La Palma, central Costa Rica, altitude about 1,460 meters, by C. Wercklé. Additional material of the same collection is mounted on sheets 678448 and 678451.

ADDITIONAL SPECIMENS EXAMINED:

COSTA RICA: La Palma, September 8, 1898, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 12536). Cultivated in a garden, Guadalupe, October, 1910, *Jiménez* 19.

The tree grows in the humid forest at the summit of the mountains about La Palma, a region swept by the moist trade winds from the east. The surrounding trees are usually covered with lichens and other epiphytes, but the trunks of Wercklea are bare of such growths.

PELTAEA, A NEW GENUS OF MALVACEAE.

There is a small group of Malvaceae, consisting of 4 to 6 species, which has generally been treated as a section of Malache (*Pavonia*), although two of the species were described by Presl in the genus *Malachra*. The plants of this group in general appearance are very unlike the species of true Malache, and are distinguished also by the large leaflike floral bracts and the peltate-appendaged involucre bracts. The writer wishes to propose for the genus the name *Peltaea*, first used by Presl for a section of *Malachra*.

PELTAEA (Presl) Standley, gen. nov.

Malachra section *Peltaea* Presl, Rel. Haenk. 2: 125. 1836.

Pavonia section *Peltaea* Gürke in Mart. Fl. Bras. 12^a: 475. 1892.

Low shrubs, or sometimes herbaceous plants woody only at the base, with slender or stout branched stems; pubescence usually abundant and composed of stellate hairs; leaves usually broad, petiolate, toothed; stipules narrow, commonly deciduous; inflorescence capitate or subcapitate, 3 to 10-flowered, on a long axillary peduncle, or sometimes sessile; bracts large, similar to the leaves, 1 or 2 subtending each head of flowers and usually surpassing them and concealing the carpels; bracts of the involucre 8 to 11, in a single series, each commonly with a peltate enlarged blade at the apex, at least always enlarged toward the apex; calyx campanulate, 5-lobed; petals yellow or purplish red, showy; stamen tube and pistil about equaling the petals; styles 10, rather short, erect; stigmas capitate; carpels 5, blunt, sometimes mucronulate, glabrous or pubescent, with a longitudinal dorsal nerve, elsewhere smooth or obscurely rugulose; seeds glabrous.

TYPE SPECIES: *Pavonia sessiliflora* H. B. K.

Peltaea ovata (Presl) Standley.

The type was collected on the Isthmus of Panama by Haenke. Two Panama collections may be referred here: Fendler's no. 21, from Chagres, and Pittier's no. 2149, from "among bushes around Culebra." It seems fairly certain that these specimens represent Presl's species, although one can not be absolutely certain without examining the type. They differ from *P. sessiliflora* in having 5-nerved or 3-nerved, lanceolate or lance-ovate leaves, with a short rough pubescence and pubescent carpels. In *P. sessiliflora* the leaves are 7-nerved, broadly ovate-cordate, and velvety with a very dense pubescence and the carpels are glabrous.

Peltaea riedelii (Gürke) Standley.

Pavonia riedelii Gürke in Mart. Fl. Bras. 12^a: 493. pl. 91. f. 2. 1892.

Province of Matto Grosso, Brazil.

Peltaea sessiliflora (H. B. K.) Standley.

Pavonia sessiliflora H. B. K. Nov. Gen. & Sp. 5: 281. 1821.

Pavonia bracteosa Benth. Journ. Bot. Hook. 4: 118. 1842.

Malachra trinervis Presl, Rel. Haenk. 2: 126. 1836.

Trinidad and Panama to Colombia and Brazil.

Peltaea speciosa (H. B. K.) Standley.

Pavonia speciosa H. B. K. Nov. Gen. & Sp. 5: 231. pl. 477. 1821.

Colombia and Venezuela to Brazil and in the West Indies.

THE GENUS *LOPIMIA*.

This genus of Malvaceae, described by Martius in 1823, was recognized by several writers in the earlier part of the nineteenth century, but in later years has always been included in Pavonia. Indeed, it has not been separated even as a subgenus or section. To the writer, the two species to be placed here seem well worthy of generic recognition. The genus may be characterized as follows:

LOPIMIA Mart.

Lopimia Mart. Nov. Act. Acad. Caes. Leop. Carol. 11: 96. 1823.

Branched shrubs with large ovate-cordate soft-pubescent toothed petioled leaves; stipules and bracts linear to subulate, persistent or deciduous; flowers on axillary, 1 to many-flowered peduncles near the ends of the branches, numerous, appearing paniculate, the clusters of the inflorescence mostly shorter than the leaves; bracts of the involucre 12 to 22, linear or narrowly linear-lanceolate, densely pubescent, in a single series; calyx very short, one-fourth as long as the involucral bracts or shorter, shallowly lobed; corolla large and showy, much exceeding the involucre, the petals somewhat clawed at the base, entire, densely soft-pubescent on the outer surface; stamen tube about as long as the corolla; style branches 10, slender, elongate, exceeding the corolla, erect, the stigmas small, capitate, tuberculate or pubescent; carpels 5, more or less reticulate, at maturity with a thin viscid mucilaginous coating, becoming glabrous and shining when dried, rounded at the apex, readily separable when mature from the ringlike hollow gynobase, tardily if at all dehiscent; seeds reniform, smooth, glabrous.

The genus was held distinct, originally, because of the mucilaginous covering of the carpels and the very numerous involucral bracts. In the second species of the genus listed here from Panama the bracts are only 12, a number equaled in true species of Malache (Pavonia). The mucilaginous coating of the carpels, however, suffices to distinguish the genus. When dry this gives the fruit a glossy appearance quite unlike that of the dull surface of species of Malache. In addition, the two species of *Lopimia* are very different in general appearance from the members of the genus Malache by the large, showy, very numerous flowers and the broad, densely soft-pubescent leaves. Another character worthy of mention is found in the very short, thin calyx which is pressed almost flat by the growth of the carpels. In the form of the flowers and fruit, *Lopimia* suggests *Malvaviscus* rather than Malache.

Lopimia dasypetala (Turcz.) Standley.

Pavonia dasypetala Turcz. Bull. Soc. Nat. Moscou 31: 189. 1858.

TYPE LOCALITY: Near San Cristóbal, Province of Mérida, Venezuela, at an altitude of 750 meters.

RANGE: Costa Rica to Venezuela.

SPECIMENS EXAMINED:

PANAMA: Without locality, *Hayes* 216. Sunny edge of forest, railroad relocation between Gorgona and Gatún, *Pittier* 2273. Lion Hill, Gatún, *Goldman* 1855.

COSTA RICA: Térraba, February 5, 1891, *Pittier*.

A shrub 1 to 3 meters high, with purplish pink flowers.

This is probably the plant collected by Hayes (no. 482) reported by Hemsley¹ as *Pavonia velutina* St. Hil., that name being a synonym of *Lopimia malacophylla*.

Our Panamanian and Costa Rican plants may not be true *dasypetala*, for the writer has seen no Venezuelan specimens. They agree fully with the original description of the species, but this is not as complete as might be desired. Turczaninow states that

¹ Biol. Centr. Amer. Bot. 1: 117. 1879.

the fruit does not have a mucilaginous coat, but he makes the same statement of *Lopimia insignis* Fenzl, which is a synonym of *L. malacophylla*. He could not be certain regarding this point from dried fruit alone.

The only other species of this genus known at present is the type species, *Lopimia malacophylla*. It is characterized by its numerous (18 to 22) involucre bracts, *L. dasypetala* having usually only 12. These are much wider, too, in the latter species. There are other prominent differences besides, *L. dasypetala* having a less abundant pubescence and larger flowers.

Lopimia malacophylla has a wide range in South America, extending from Colombia and Bolivia through most of Brazil. It is found also in Cuba and in southern Mexico. From the latter region Hemsley¹ reports a single specimen collected by Jurgensen (no. 909). In the National Herbarium there is a second sheet, collected by E. W. Nelson (no. 2479) near Plunia, Oaxaca, altitude 900 to 1,440 meters, March 17, 1895. Seeds of this collection were brought to Washington, where the plants were grown in the greenhouse, flowering and fruiting in 1897. It may be that the plant in Mexico is introduced.

FOUR NEW SPECIES OF MALACHE FROM PANAMA AND COSTA RICA.

Many of the species of Malache (better known under the name Pavonia) are widely dispersed tropical weeds. Others, however, are local in their distribution. To the latter group belong four species of Panama and Costa Rica which appear to be without names.

Malache fulva Standley, sp. nov.

Stems stout, flexuous, densely pubescent with short stout white hairs, besides being densely hispid with long yellow hairs; stipules subulate, 5 to 8 mm. long, deciduous, hispid; leaf blades elliptic-oblong, asymmetrical, 7 to 14 cm. long, 26 to 55 mm. wide, abruptly short-acuminate, rounded at the base, coarsely crenate or crenate-dentate, pinnately veined, abundantly hispid on both surfaces, some of the hairs sometimes branched; petioles stout, 9 mm. long or less, densely hispid, the uppermost leaves nearly sessile; peduncles solitary in the axils or in a terminal few-flowered corymb, 20 to 75 mm. long, stout, abundantly hispid; involucre bracts about 10, linear-subulate, 15 to 20 mm. long, hispid with yellow bristles; calyx 4 mm. long, puberulent, shallowly lobed, the lobes broad and rounded; flowers not seen; fruit hemispheric, scarcely lobed; carpels 5, glabrous, with prominent dorsal and lateral nerves and less prominent transverse ones, each carpel with 3 slender spinose processes at the apex, these spreading, about 1 cm. long, retrorsely barbed at the apex; seeds brown, puberulent.

Type in the U. S. National Herbarium, no. 578479, collected in cultivated fields at the Hacienda de Chirripó, Costa Rica, altitude 100 meters, March, 1900, by H. Pittier (Inst. Fís. Geogr. Costa Rica, no. 16080). An additional specimen examined is from the Hacienda de Zent, Costa Rica (*Tonduz* 388).

A member of the subgenus *Typhalaea*, but not closely related to any described species of the group. The leaves are similar in size and outline to those of *M. typhalaea* and *M. rosea*, but the inflorescence and fruit are very different. *Malache fulva* may be distinguished at once from all the Mexican and Central American species by the abundant yellow, hispid pubescence.

¹ Biol. Centr. Amer. Bot. 1: 117. 1879.

Malache maxonii Standley, sp. nov.

Stems herbaceous, about 70 cm. high, stout, branched, densely hispid with stiff, fulvous, stellate or sometimes simple hairs; petioles stout, 7 to 30 mm. long, hispid like the branches; leaf blades obovate to rhombic-obovate or oblanceolate-oblong, 10 to 18 cm. long, 3 to 7 cm. wide, acute to somewhat abruptly acuminate, narrowed to the base, coarsely and very irregularly crenate, sometimes doubly crenate, some of the lobes often much enlarged, hispidulous on both surfaces with stiff, spreading, yellowish, simple or stellate hairs, more densely so beneath; stipules linear-subulate, 9 to 12 mm. long; peduncles axillary or terminal, loosely branched, hispid, 8 to 15 cm. long; pedicels 1 to 10 cm. long, elongating in age, sparsely hispid or glabrate; bracts at the base of the pedicels 5 to 9 mm. long, hispid, 3-parted into linear lobes; involucre bracts 10 to 12, linear, about 8 mm. long, united only at the base, hispidulous with simple or 2-parted hairs; calyx scarcely more than half as long as the bracts, finely pubescent with short stout stellate hairs, the lobes broadly triangular; corolla pink, 8 to 10 mm. long, the petals finely and sparsely stellate-pubescent on the outer surface; carpels of the fruit 7 mm. high, thin-walled, smooth on the back, glabrous, each bearing 3 slender, erect, retrorsely barbed beaks of about the same length.

Type in the U. S. National Herbarium, no. 693056, collected on a partially shaded bank by the trail in the forest along the Río Ladrillo, above El Boquete, Chiriquí, Panama, at an altitude of 1,200 to 1,300 meters, March 17 to 19, 1911, by William R. Maxon (no. 5394). Additional material of the same collection is mounted on sheets nos. 675761 and 675762. Also collected by Mr. Pittier (no. 3287) in the same locality at the same time.

In general appearance this resembles *M. rosea*, but it is amply distinct in the 3-parted bracts and coarse pubescence. The inflorescence, too, is not congested as in that species, but is loose and open. The proposed species is related to two South American ones, *Malache peruviana* and *M. warmingiana*, both of which have very different involucre bracts.

Malache panamensis Standley, sp. nov.

Annual, 1 meter high or less, simple at the base, with numerous ascending branches above; branches slender, minutely cinereous, with an admixture of long soft white hairs above, especially on the peduncles; leaves rather numerous, ovate to oblong-ovate or lanceolate, 3.5 to 7 cm. long, 1.6 to 3.2 cm. wide, rather abruptly acuminate, rounded to subcordate or cordate at the base, the lobes often overlapping, coarsely but evenly serrate, the teeth acute, 3 or 5-nerved, when 5-nerved the two lateral nerves less conspicuous than the others, bright green on the upper surface but sparsely scaberulous, dull and slightly paler beneath and sparsely pubescent with very slender short stellate hairs; petioles slender, 1.6 to 3.2 cm. long, cinereous and often pilose; stipules subulate, 3 mm. long or less, early deciduous; pedicels 1-flowered, solitary in the axils, slender, 2 to 3 cm. long, ascending, jointed above the middle, pilose or short-pubescent; involucre bracts usually 8, linear, 6 to 8 mm. long, acute, hirsute-ciliate and slightly cinereous; calyx half to two-thirds as long as the bracts, cleft halfway to the base or more, the lobes oblong-lanceolate to triangular, acute, 3-nerved, ciliate and somewhat hirsute, whitish near the base but green near the tip; corolla white, the petals spreading, broadly oblong, rounded or emarginate, short-clawed, ciliolate, sparingly pubescent on the outer surface; stamen tube less than half as long as the petals, glabrous; styles 10, spreading, stout, little exceeding the stamen tube; stigmas capitate, rounded, pubescent; carpels 5, about half as long as the bracts, rounded at the apex, glabrous, smooth or obscurely nerved; seeds very dark brown, pubescent with short coarse appressed hairs.

Type in the U. S. National Herbarium, no. 677212, collected on the edge of the forest, Sabana de Panama, Canal Zone, Panama, altitude 10 to 50 meters, January 25, 1911, by H. Pittier (no. 2548).

An additional specimen examined is from Chepo, Province of Panama, altitude 60 meters (*Pittier* 4448).

Related to *Pavonia geminiflora* Moric., but differing in its pubescent seeds, lack of glandular pubescence, narrow, fewer nerved leaves, and smaller flowers. The leaves of the type specimen suggest the leaflets of *Clematis virginiana* and its allies. Another plant which resembles *M. panamensis* in vegetative characters is *Malache arachnoidea* (Presl) Kuntze. That species, however, has spiny carpels. The name *arachnoidea* is given to the species of western Mexico, not because of the character of the pubescence, as one might expect, but on account of the resemblance of the fruit and bracts to the body and legs of a spider.

***Malache penduliflora* Standley, sp. nov.**

Stems slender, branched, densely pubescent with short stiff tawny stellate hairs; petioles stout, 6 to 12 mm. long, densely stellate-hispidulous; leaf blades elliptic to elliptic-oblong or even obovate, usually broadest at the middle but sometimes above the middle, 8.5 to 15 cm. long, 2.5 to 5.5 cm. wide, long-acuminate, sometimes abruptly so, more or less oblique at the base and rounded, thin, bright green, stellate-hispidulous with tawny hairs on both surfaces, rather sparsely so on the upper surface; stipules 4 to 5 mm. long, linear, long-attenuate, soon deciduous; flowers solitary, axillary, pendulous, on stellate-hispidulous peduncles 2 to 8.5 cm. long; involucre bracts 8 to 10, united only at the base, linear, attenuate, about 7 mm. long, densely stellate-hispidulous; calyx of the same length as the bracts, the lobes ovate, acute, reddish, finely pubescent with stiff stellate hairs; corolla pink, 12 mm. long; carpels 5, about 9 mm. high, reddish, glabrous, coarsely reticulate-veined on the back, each bearing 3 retrorsely barbed spines about 5 mm. long.

Type in the U. S. National Herbarium, no. 677582, collected in the humid forest around Los Sigüas Camp, southern slope of Cerro de la Horqueta, Chiriquí, Panama, at an altitude of about 1,700 meters, March 17 to 19, 1911, by H. Pittier (no. 3188).

In the form of the flowers and in the small stipules this resembles *Malache leucantha*, a South American species, but that has a broad, much branched inflorescence and the involucre bracts are united for nearly half their length.

A NEW WALTHERIA FROM COLOMBIA.

The plant described below was distributed as *Waltheria involucreata* Benth., "narrow bracted form." It is not closely related, however, to that species, in which the bracts are united, thin, and accrescent. Apparently it is allied to the Panamanian *Waltheria glomerata* Presl, which is distinguished by its obovate-oblong leaves, rounded at the base, its closely sessile flower clusters, and its narrower acute bracts.

***Waltheria subcordata* Standley, sp. nov.**

Young branches densely and finely stellate-pubescent, slender, straight, the internodes 3 to 8 cm. long; stipules linear-subulate, 4 to 7 mm. long; petioles stout, 1 to 2 cm. long, densely and finely stellate-pubescent with brown hairs; leaf blades narrowly oblong-ovate to broadly ovate or rounded-ovate, 6.5 to 13 cm. long, 2.5 to 9.5 cm. wide, acute at the apex, subcordate or even cordate at the base, often inequilateral, finely or coarsely crenate, densely and finely stellate-pubescent on the upper surface when young, becoming glabrate in age, somewhat paler beneath and velvety-pubescent with short stellate hairs; flowers in dense clusters 1 to 2 cm. broad, these peduncled in the axils of the leaves, or the upper racemose; peduncles 5 to 12 mm. long, or some of the clusters sometimes subsessile; flowers usually 2 together, subtended by several bracts, these distinct, 6 mm. long, usually obovate-spatulate but sometimes narrowly oblanceolate, obtuse, finely and very densely stellate-pubescent; flowers very shortly

pediceled; calyx obpyramidal, 6 mm. long, the lobes triangular, acute, about half as long as the tube; corolla yellow, about equaling the calyx; fruit not seen.

Type in the U. S. National Herbarium, no. 533011, collected in the region of Santa Marta, Colombia, at an altitude of 150 meters, by Herbert H. Smith (no. 493).

NEW OR NOTABLE EBENACEAE FROM MEXICO.

There are here included descriptions of 3 new species of *Diospyros* and 2 of *Maba*, chiefly from the western coast of Mexico. Several species of these two genera have been described from Mexico, but most of them are poorly represented in American herbaria. The Mexican species of *Diospyros* are particularly interesting. Probably most of them are of local distribution.

The common persimmon of the eastern United States, *Diospyros virginiana*, apparently deserves greater attention than has heretofore been given it. Early American botanists, notably Pursh and Rafinesque, believed that two or more species of *Diospyros* occurred in the eastern United States. Casual inspection of the material in the National Herbarium inclines the writer to the belief that at least two distinct forms are included under *virginiana*, and probably several species can be distinguished when there has been accumulated a large amount of herbarium material properly annotated. At present the material available is altogether insufficient for a critical study of the supposed aggregate.

***Maba latifolia* Standley, sp. nov.**

Section *Macreightia*. Shrub or small tree; branches slender, dark brown or grayish, the branchlets densely hirtellous with short fulvous hairs, glabrate in age; petioles stout, 1.5 to 3 mm. long, densely hirtellous; leaf blades broadly oblong, oval, or oval-obovate, 3.2 to 6.5 cm. long, 1.7 to 3 cm. wide, rounded at the apex or broadly obtuse, rounded or obtuse at the base, subcoriaceous, grayish green on the upper surface and sparsely puberulent, or densely short-villous when young, beneath copiously short-villous, the margins slightly revolute, the veins prominent beneath, coarsely reticulate; flowers not known; fruit solitary, axillary, subsessile on a very short thick pedicel; fruiting calyx 3-lobed nearly to the base, the lobes orbicular-ovate, obtuse or rounded at the apex, coarsely veined, densely puberulent throughout; fruit subglobose, about 2.5 cm. in diameter, yellowish outside and densely pubescent about the apex, elsewhere glabrate, 6-celled, the pulp reddish; seeds oval or oval-oblong in outline, 11 mm. long, 6 to 7 mm. in diameter, about 5 mm. thick, acute or obtuse on the inner edge, dark reddish brown, finely and distinctly rugulose.

Type in the U. S. National Herbarium, no. 637592, collected in dry coastal thickets near Guadalupe, Sinaloa, Mexico, April 18, 1910, by J. N. Rose, Paul C. Standley, and P. G. Russell (no. 14709). Specimens in fruit, just coming into leaf, were collected on a dry hillside at Mazatlán, Sinaloa, April 7, 1910 (*Rose, Standley & Russell* 14147).

Three species of *Maba*, all of the section *Macreightia*, have been described from Mexico: *M. intricata* (A. Gray) Hiern, from Cape San Lucas, Lower California; *M. albens* (Presl) A. DC., from Acapulco; and *M. acapulcensis* (H. B. K.) Hiern, also from Acapulco. The habitats of two other species, *M. pavonii* (A. DC.) Hiern and *M. salicifolia* (H. B. K.) Hiern, are doubtful and may be Mexican. Judging from descriptions, the present species is clearly distinct from all of these, differing from each in definite characters of the fruit, leaf outline, or pubescence. Unfortunately only two

of the five species, *M. intricata* and *M. albens*, are represented in the National Herbarium by specimens. The last mentioned species, until recently unrepresented, was collected on the Cerro de Picacho, Oaxaca, in July, 1914, by C. A. Purpus (no. 7176).

***Maba verae-crucis* Standley, sp. nov.**

Branches slender, the older ones gray, the branchlets at first canescent but later glabrate; petioles 3 mm. long, densely covered with short appressed hairs; leaf blades rhombic-obovate or elliptic-oblong, 5.5 to 8.5 cm. long, 1.8 to 4 cm. wide, narrowed at both ends, acute or acuminate at the apex, acute at the base, thin, green, concolorous, the upper surface at first canescent but finally glabrate and obscurely papillose, the lower surface sparsely strigose, minutely pellucid-punctate, the midvein impressed above, prominent beneath, the lateral veins and the veinlets weak and inconspicuous; flowers not known; fruits solitary, axillary, on very stout pedicels 3 to 4 mm. long; fruiting calyx 15 mm. broad, shallowly 3-lobed, the lobes broadly rounded, densely sericeous and smooth inside, coarsely rugose and sparsely sericeous outside; fruit subglobose, 12 to 16 mm. in diameter, 6-celled, glabrate at maturity, but sericeous when young; mature seeds not seen.

Type in the U. S. National Herbarium, no. 569278, collected at Catemaco, Veracruz, Mexico, altitude 300 meters, April 26, 1894, by E. W. Nelson (no. 429).

This proposed species appears to be related to *Maba acapulcensis*, but it differs in its smaller fruit and shallowly lobed calyx, and it does not have the hirtellous leaves ascribed to the latter.

***Diospyros blepharophylla* Standley.**

Diospyros ciliata A. DC. in DC. Prodr. 8: 229. 1844, not *D. ciliata* Raf. 1836.

***Diospyros palmeri* Eastw. Proc. Amer. Acad. 44: 604. 1909.**

The species was described from fruiting material collected in the vicinity of San Dieguito, San Luis Potosí, Mexico, early in June, 1905, by Dr. Edward Palmer (no. 631). In 1907 Dr. Palmer made two additional collections of the same species in the vicinity of Victoria, Tamaulipas (nos. 116 and 369). These are exactly like the one from San Luis Potosí. One of them (no. 116) bears very young fruits, upon some of which the corolla still persists. This is globose-urceolate, about 5 mm. long, glabrous outside near the base, but puberulent above. The corolla lobes are oval, rounded at the apex, glabrous on the inner surface, but densely pubescent on the outer. The species is a member of the section *Danzleria*, to which *Diospyros virginiana* also belongs, but there is little resemblance in the general appearance of the two species.

***Diospyros rosei* Standley, sp. nov.**

Section *Paralea*. Tree with persistent leaves; branches covered with grayish brown bark having numerous lighter colored lenticels, the branchlets slender, brownish yellow, puberulent when young but soon glabrate; leaves alternate, on stout petioles 6 to 8 mm. long, these finely puberulent or in age glabrate; leaf blades oblanceolate-oblong or rarely oblong-obovate, 6 to 14.5 cm. long, 3 to 4.5 cm. wide, rounded at the apex, cuneate or rarely only obtuse at the base, subcoriaceous, green or grayish green on the upper surface and glabrous except along the puberulent veins, minutely puberulent beneath, especially along the veins, the midvein very prominent, the lateral veins 5 to 7 on each side, irregularly spaced, laxly anastomosing near the margin, the veinlets very numerous, prominent, and reticulated; flowers not known; fruit axillary, the pedicels solitary or fascicled, 5 to 15 mm. long, stout, puberulent; fruiting calyx 3.5 to 4 cm. broad, puberulent throughout or finally glabrate, lobed nearly to the base, the 5 (rarely 4) lobes ovate or oval-ovate, 6 to 10 mm. broad, acute or acutish, prominently veined; fruit depressed-globose, 8 to 10-celled, about 2.5 cm. in diameter, densely pubescent when young with short appressed hairs, glabrate in age; mature seeds not seen.

Type in the U. S. National Herbarium, no. 300363, collected at Acaponeta, Territorio de Tepic, Mexico, July 2 or 3, 1897, by J. N. Rose (no. 1522). Collected again by Dr. Rose near Acaponeta, July 29, 1897 (no. 3285).

Very probably to be referred here are specimens of fruit sold in the market at Mazatlán, Sinaloa (*Rose, Standley & Russell* 13981), under the name "guayaparín." The form of the calyx lobes suggests *Diospyros rosei*, but there are, of course, no leaves present. The fruit is black and nearly 4 cm. in diameter; the seeds are broadly oval to suborbicular in outline, 11 to 13 mm. long, 9 to 10 mm. wide, and 3 to 4 mm. thick, acute or acutish on the inner side, dark brown, and slightly roughened.

Diospyros rosei is closely related to *D. sonorae*. The calyx lobes, however, are of different form, being broadest below the middle and acute or acutish at the apex, rather than broadest above the middle and obtuse, as in the latter species; and the leaves are much more narrowed at the base, thinner, and on longer petioles.

***Diospyros sonorae* Standley, sp. nov.**

Section Paralea. A small or large tree with stout thick trunk and rounded crown, the branches spreading; branchlets slender, gray, at first densely puberulent but glabrate in age; leaves persistent, alternate, the petioles stout, 2 to 3 or rarely 6 mm. long, puberulent; leaf blades oblong, narrowly oblong, or rarely oblanceolate-oblong, 5.5 to 13 cm. long, 2 to 4.2 cm. wide, rounded at the apex and sometimes emarginate, broadly rounded or obtuse at the base or sometimes obtusely cuneate, subcoriaceous, pale grayish green, glabrous on the upper surface, minutely puberulent beneath, at least when young, the midvein prominent beneath, slightly impressed above, the lateral veins 6 or 7 on each side, connected by numerous prominent reticulate veinlets; flowers not seen; fruit solitary or fascicled in the axils, on stout ligneous pedicels 12 to 15 mm. long; fruiting calyx 3 to 4 cm. broad, 5 (rarely 4-) lobed nearly to the base, the lobes oblong or elliptic-oblong, 5 to 11 mm. broad, broadest at or above the middle, obtuse or rounded at the apex, finely puberulent or glabrate, conspicuously veined; fruit depressed-globose, about 2.5 cm. in diameter, densely fulvous-puberulent when young, glabrate in age, 8-celled; seeds suboval in outline, 12 mm. long, 8 mm. broad, 6 mm. thick, blackish brown, cuneate in cross section, the inner edge very acute.

Type in the U. S. National Herbarium, no. 335774, collected at Alamos, Sonora, Mexico, December 27, 1898, by E. A. Goldman (no. 276).

ADDITIONAL SPECIMENS EXAMINED:

SONORA: Alamos, cultivated in the edge of town, March 10, 1910, *Rose, Standley & Russell* 12947. Two miles west of Hermosillo, cultivated, March 8, 1910, *Rose, Standley & Russell* 12543.

In spite of the absence of flowers there is little doubt that this species is referred correctly to the section Paralea. It is related probably to *D. guianensis* (Aubl.) Gürke (*D. paralea* Steud.), a native of the Guianas, Brazil, and Colombia, a species with sessile fruit and broader, thinner, acute, deep green leaves. The Sonoran tree has been confused with *Diospyros ebenaster* Retz., a species which is probably native in Malaysia and is widely cultivated in tropical regions. At the beginning of the nineteenth century *D. ebenaster* was found growing at Cuernavaca, Mexico, doubtless cultivated. In the U. S. National Herbarium there are Mexican specimens from Cuernavaca (*Rose & Hough* 4435, *Pringle* 6992), La Junta, Chiapas (*Collins & Doyle* 14), and the vicinity of Guadalajara (*Safford* 1416, 1463). *Pringle's* no. 6992 was distributed as *D. ebenum* Koen., but it is evidently not that species. *Diospyros ebenaster* is distinguished from *D. sonorae* by its very large, inconspicuously veined, glabrous leaves and larger fruit on short pedicels.

Diospyros sonorae appears to be known only in cultivation, but probably it is a native of the western slopes of the northern Sierra Madre. It is known at Hermosillo as "guayaparín," a name applied also to other species of this genus. The fruit is edible, but the black pulp is unattractive in appearance and insipid to the taste.

Diospyros sphaerantha Standley, sp. nov.

Section Paralea. Tree with deciduous leaves; branches dark gray, bearing numerous large, pale gray lenticels, the branchlets slender, fulvous-puberulent and sparsely strigillose with slender white hairs; leaves (immature) alternate, on petioles 4 to 5 mm. long, these strigillose and puberulent; leaf blades oblong or oblong-elliptic, 4.3 to 8 cm. long, 2 to 3.3 cm. wide, obtuse at the apex, obtuse or rounded at the base, thin, drying black, sparsely strigillose on both surfaces with very short slender whitish hairs, the veins only slightly prominent in the young leaves; pistillate flowers very numerous, axillary, solitary or fascicled, the slender pedicels 5 to 10 mm. long, densely fulvous-puberulent; calyx at anthesis 3 cm. in diameter, spreading, lobed nearly to the base, the 5 lobes ovate, narrowly ovate, or ovate-oval, 5 to 8 mm. broad, acute to acuminate, thin, densely puberulent outside the base and thinly pubescent upward, within puberulent at the base but glabrous toward the apex; corolla globose-urceolate, about 8 mm. in length and diameter, densely fulvous-tomentulose outside, the lobes rounded at the apex, glabrous within; ovary globose, densely tomentulose, the style 1 to 1.5 mm. long.

Type in the U. S. National Herbarium, no. 302159, collected in the foothills of the Sierra Madre near Colomas, Sinaloa, Mexico, July 13 to 20, 1897, by J. N. Rose (no. 3194).

Apparently *Diospyros sphaerantha* is closely related to *D. rosei* and at first the writer believed that the specimens represented a single species. In the latter species, however, the leaves are persistent, while in *D. sphaerantha* they are certainly deciduous. In the latter, too, the calyx lobes are not pubescent throughout and they are more acute. Furthermore, there is considerable difference in leaf outline. The proposed species is noteworthy because of the unusual development of the calyx at anthesis.

A NEW STYRAX FROM PANAMA.

There appeared a few years ago an elaborate monograph of the genus *Styrax*, by Miss Janet Perkins.¹ Specimens collected in Panama by Mr. Pittier, however, can not be referred to any of the Central American or Colombian species described in that work, and are accordingly here described as new.

Styrax panamensis Standley, sp. nov.

A tree, 8 to 10 meters high; branches terete, the older ones grayish, the young ones slender, densely covered with short fulvous stellate hairs; leaves alternate, the petioles stout, 6 to 16 mm. long, fulvous-tomentulose; leaf blades oval or oval-elliptic, 13 to 20 cm. long, 6 to 11 cm. wide, abruptly acuminate or attenuate at the apex, the acute tip 5 to 18 mm. long, rounded or rounded-cuneate at the base, chartaceous, entire, bright green and glabrate above in age, beneath densely covered with microscopic stellate gray hairs, the veins furnished with numerous coarser fulvous stellate hairs, the midvein stout, impressed above, the lateral veins 6 or 7 on each side, prominent beneath, impressed above, curvately joined near the margin, the veinlets conspicuously reticulate; inflorescence axillary, of numerous densely flowered panicles 3 to 4.5 cm. long, the rachis densely fulvous-tomentulose, the bracts and bractlets linear or subulate, densely stellate-tomentulose; flowers about 1 cm. long, on pedicels 3 to 8 mm. long; calyx cupuliform, about 4.5 mm. high and 4 mm. in diameter, densely fulvous-tomentulose outside, sparsely so within, the margin truncate, very obscurely 5-denticulate; corolla 5-parted, the tube 1 mm. long, the lobes valvate, 8 to 9 mm. long, 2 mm. wide, thick, densely covered outside with minute grayish appressed hairs, densely pubescent within; stamens 10, the free part of the filaments

¹ In Engl. Pflanzenreich 30: 1907.

plane, densely pubescent on the inner side, glabrous without, the anthers densely pilose on the margins; ovary densely pilose, the style glabrous, slightly longer than the stamens.

Type in the U. S. National Herbarium, no. 679343, collected in forests on Loma de la Gloria, near Fató, Province of Colón, Panama, altitude 10 to 104 meters, August, 1911, by H. Pittier (no. 4242).

Among the species treated in the monograph previously mentioned this appears to be nearest *S. bogotensis* Perkins,¹ described from the vicinity of Bogotá, Colombia. That species, however, has much smaller leaves (7 to 12 cm. long), shorter pedicels (2 to 3 mm.), and paniculate inflorescence.

Mr. Pittier collected another species of the genus, *Styrax argenteus* Presl, in the vicinity of Olá, Province of Coclé, Panama, early in December, 1911 (no. 5076). Miss Perkins in 1902 described another species, *S. warscewiczii*,¹ from Veraguas, Panama, the type being Warscewicz's no. 203.

TARDAVEL A VALID GENERIC NAME TO REPLACE BORRERIA.

It is evident that the name *Borreria* Meyer can not be applied to a genus of Rubiaceae, since it had been used previously by Acharius to designate a group of lichens, as stated by Meyer² when he dedicated the second genus to the lichenologist Borrer. The name *Diodioides* is the first synonym of *Borreria* cited by Dalla Torre and Harms.³ This, however, was merely cited by Loeffling⁴ as a synonym, so is a nomen nudum. *Tardavel* was published by Adanson⁵ in 1763. No specific name is cited, but there is a reference to plate 76 of Rheede's *Hortus Indicus Malabaricus*. This plate had been cited by Linnæus in the second edition of the *Species Plantarum*⁶ under *Spermacoce hispida*. That plant thus becomes the type of the genus *Tardavel*. The generic name was taken up in 1898 by Hiern,⁷ who transferred a number of species of *Borreria* to *Tardavel*.

The genus is a large one, numerous species occurring in tropical America. Only five, *Tardavel ocymoides* (Burm.) Hiern, and the following, have so far been found in Panama:

***Tardavel laevis* (Lam.) Standley.**

Spermacoce laevis Lam. Tabl. Encycl. 1: 273. 1791.

Borreria laevis Griseb. Abh. Ges. Wiss. Göttingen 7: 231. 1857.

***Tardavel latifolia* (Aubl.) Standley.**

Spermacoce latifolia Aubl. Pl. Guian. 1: pl. 19. f. 1. 1775.

Borreria latifolia Schum. in Mart. Fl. Bras. 6^o: 61. 1888.

***Tardavel spinosa* (L.) Standley.**

Spermacoce spinosa L. Sp. Pl. ed. 2. 148. 1762.

Borreria spinosa Schlecht. & Cham. Linnaea 3: 340. 1825.

***Tardavel tenella* (H. B. K.) Standley.**

Spermacoce tenella H. B. K. Nov. Gen. & Sp. 3: 270. 1818.

Borreria tenella Schlecht. & Cham. Linnaea 3: 317. 1828.

¹ Bot. Jahrb. Engler 31: 480.

² Prim. Fl. Esseq. 79. 1818.

³ Gen. Siph. 506. 1900-1907.

⁴ Iter Hisp. 201. 1759.

⁵ Fam. Pl. 145. 1763.

⁶ Page 149.

⁷ Cat. Pl. Welw. 2: 503.

RESTORATION OF THE GENERIC NAME EVEA, WITH DESCRIPTIONS OF TWO NEW SPECIES.

The genus to which it is here proposed to restore the earliest name, *Evea*, has usually been known as *Cephaelis* or *Uragoga*, when it has been distinguished from *Psychotria*. The name *Uragoga* was used for it prior to 1753, but not afterwards until taken up by Baillon in 1880.¹ *Cephaelis* was published by Swartz in 1788.² In 1775 Aublet had published three generic names, *Evea*, *Carapichea*, and *Tapogomea*, all of which have always been referred to *Cephaelis* or *Uragoga*. *Evea* has priority of place in Aublet's *Histoire des Plantes de la Guiane Française* and consequently is the name to be adopted for the genus. The type species is *Evea guianensis* Aubl.

The following list of species includes all those known to occur in Panama. There are included descriptions of two new species, one from Panama and one from Colombia.

***Evea axillaris* (Swartz) Standley.**

Cephaelis axillaris Swartz, Prodr. Veg. Ind. Occ. 45. 1788.

Tapogomea axillaris Poir. in Lam. Encycl. Suppl. 7: 585. 1806.

***Evea elata* (Swartz) Standley.**

Cephaelis elata Swartz, Prodr. Veg. Ind. Occ. 45. 1788.

Cephaelis punicea Vahl, Eclog. Amer. 1: 19. 1796.

Cephaelis costaricensis Schlecht. Linnaea 28: 546. 1857.

***Evea ipecacuanha* (Brot.) Standley.**

Calicocca ipecacuanha Brot. Trans. Linn. Soc. 6: 137. pl. 11. 1802.

Ipecacuanha officinalis Arruda, Diss. Pl. Braz. 44. 1810.

Collected in the vicinity of San Felix, eastern Chiriquí, Panama, at an altitude of 120 meters or less, by H. Pittier (no. 5271).

This plant furnishes the ipecac of commerce, which is exported in large quantities from northern South America and in small amounts from Panama. The Panama specimens are in fruit only, but seem to agree well with descriptions of the Brazilian plant, except that they are less pubescent.

***Evea muscosa* (Jacq.) Standley.**

Morinda muscosa Jacq. Enum. Pl. Carib. 16. 1760.

Cephaelis muscosa Swartz, Prodr. Veg. Ind. Occ. 46. 1788.

***Evea tomentosa* (Aubl.) Standley.**

Tapogomea tomentosa Aubl. Pl. Guian. 1: 160. pl. 61. 1775.

Cephaelis tomentosa Vahl, Eclog. Amer. 1: 19. 1796.

***Evea campyloneuroides* Standley, sp. nov.**

Small tree; young branches stout, densely covered with loose slender whitish hairs; stipules united at the base, green, persistent, 15 to 18 mm. long, bilobate, the lobes lanceolate, long-attenuate, densely sericeous outside, glabrous within; petioles stout, 2 to 3 cm. long, densely pubescent like the stems; leaf blades oval or elliptic-oval, 14 to 18 cm. long, 5.5 to 7 cm. wide, abruptly acuminate or short-caudate, the tip 10 to 15 mm. long, acute or acuminate at the base, thin, deep green on the upper surface, slightly paler beneath, glabrous above except along the midvein, sericeous beneath

¹ Hist. Pl. 7: 280.

² Prodr. Veg. Ind. Occ. 45.

along the veins with slender, loose, rather long, dirty white hairs, the lateral veins conspicuous, 27 to 32 on each side, parallel, anastomosing near the margin, finer secondary veins present between the primary ones and parallel with them, connected with the primary veins by fine transverse veinlets at regular intervals; peduncles terminal, 6 to 13 cm. long, very densely covered with long, fine, spreading, dirty white hairs; bracts orbicular-rhombic, 1 cm. long, apiculate, sericeous, green, each pair including 3 short-pedunculate heads 10 to 15 mm. in diameter, the inner peduncles 2 to 13 mm. long; bractlets green, oval-obovate, 10 mm. long, obtuse, apiculate, sericeous on both surfaces; calyx twice as long as the ovary, the two together 3 mm. long, densely sericeous, the lobes ovate, acute; corolla white, the slender tube about 7 mm. long, the lobes 2.5 mm. long, oblong, pubescent outside; fruit not seen.

Type in the U. S. National Herbarium, no. 530768, collected in sunny places in the forest near Córdoba, Dagua Valley, Pacific Coastal Zone, State of Cauca, Colombia, altitude 30 to 100 meters, December, 1905, by H. Pittier (no. 581).

Apparently not closely related to any other species; well distinguished by the form of the inflorescence and the abundant pubescence. The venation of the leaves is very similar to that found in ferns of the genus *Campyloneurum*.

Evea dichroa Standley, sp. nov.

Glabrous branched shrub 1.5 to 2 meters high; branches slender, nearly terete; stipules united at the base, green, persistent, 3 to 4 mm. long, deeply bilobate, the lobes oblong, obtuse; petioles slender, 1.5 to 2.5 cm. long; leaf blades elliptic or oblong-elliptic, 5.5 to 10.5 cm. long, 1.5 to 3.5 cm. wide, acuminate at the apex, acute or acuminate at the base, firmly herbaceous, bright green on the upper surface, slightly paler beneath, prominently veined, the lateral veins 9 to 12 on each side, parallel; peduncles terminal or rarely also axillary, 3 to 9 cm. long; bracts 15 to 20 mm. long, rounded-ovate, acutish, slightly united at the base, green or tinged with red or yellow, subtending 3 pedunculate heads, the peduncles 3 to 25 mm. long; each secondary head subtended by 2 orbicular-rhombic bracts 12 to 15 mm. long, these yellow or tinged with purple, each head consisting of 3 flowers, each flower subtended by an oblong-obovate acute bract 10 to 12 mm. long and an oblong-linear bracteole somewhat shorter; flowers sessile; calyx 3 mm. long, twice as long as the ovary, somewhat oblique, yellow, deeply 5-lobed, the lobes ovate to oblong, acute; corolla yellowish white, the tube 10 mm. long and 2 mm. in diameter, the 5 lobes 2.5 to 3 mm. long, oblong, obtuse; stamens included, inserted in the middle of the tube, the filaments about as long as the anthers, these linear, 2.5 mm. long; fruit not seen.

Type in the U. S. National Herbarium, no. 677615, collected in the humid forest of Cuesta de las Palmas, southern slope of Cerro de la Horqueta, Chiriquí, Panama, at an altitude of 1,700 to 2,100 meters, March 17 to 19, 1911, by H. Pittier (no. 3218).

Known also from specimens collected in humid forest of Alto de las Palmas, southern slope of Cerro de la Horqueta, Chiriquí, altitude, 2,100 meters, *Pittier* 3266.

In the type collection the bracts are purple or greenish purple, more or less tinged with yellow, while in the second collection they are pale yellow or greenish yellow. The species seems very distinct in the form of the inflorescence, although some of the Brazilian species likewise have 3-parted heads.

DUGGENA AN OLDER NAME THAN GONZALAGUNIA.

There is a small genus of tropical American Rubiaceae which was long known under the name *Gonzalea* Pers. In recent years the name *Gonzalagunia* Ruiz & Pavon has generally been adopted for it, this name (1794) clearly having precedence over that of Persoon (1805). There seems no valid reason why the oldest generic name,

Duggena Vahl, published in 1793, should not be applied to the group. Its type is *Duggena richardii* Vahl, which apparently is a synonym of *D. spicata*, listed below.

Four species of the genus occur in Panama: *D. ovatifolia*, described from Costa Rica; *D. panamensis*, first characterized by Cavanilles in 1801 from specimens collected on Ancón Hill, Panama; *D. hayesii*, also described from Panama; and a fourth, collected recently by Mr. Pittier, which appears to be undescribed.

***Duggena rudis* Standley, sp. nov.**

Branches slender, brownish, densely strigose with whitish tawny hairs; stipules 4 to 6 mm. long, triangular, with long filiform tips; leaves nearly sessile, the petioles 1 to 2 mm. long, the blades ovate or oblong-ovate, 35 to 55 mm. long, 14 to 24 mm. wide, rather abruptly acuminate, rounded at the base, thin, bright green, strigose on the upper surface, more densely pubescent beneath, especially along the veins, with appressed whitish hairs; racemes slender, 6 to 9 cm. long; flowers about 3 in each cluster, on very short peduncles; pedicels about 1 mm. long; bracts linear-subulate, 3 mm. long or less; corolla not seen; fruit 4-celled, depressed-globose, 2.5 mm. in diameter, densely hirsute; calyx lobes persistent, lance-linear, attenuate, nearly as long as the fruit, sparingly pubescent outside, glabrous within.

Type in the U. S. National Herbarium, no. 676602, collected in shady places along the Chagres River, near El Vigía, Panama, January 12, 1911, by H. Pittier (no. 2378).

Resembling *Duggena panamensis* in the 4-celled fruit, but readily distinguished by the small, nearly sessile leaves, narrow and longer calyx lobes, and densely pubescent fruit.

***Duggena asperula* (Wernham) Standley.**

Gonzalea asperula Wernham, Journ. Bot. Brit. & For. 51: 219. 1913.

***Duggena brachyantha* (A. Rich.) Standley.**

Gonzalea brachyantha A. Rich. in Sagra, Hist. Cuba 11: 16. 1850.

Gonzalagunia brachyantha Urban, Symb. Antill. 7: 400. 1912.

***Duggena bracteosa* (Donn. Smith) Standley.**

Gonzalea bracteosa Donn. Smith, Bot. Gaz. 33: 252. 1902.

Gonzalagunia bracteosa Robinson, Proc. Amer. Acad. 45: 405. 1910.

***Duggena grisea* (Wernham) Standley.**

Gonzalea grisea Wernham, Journ. Bot. Brit. & For. 51: 218. 1913.

***Duggena hayesii* (Wernham) Standley.**

Gonzalea hayesii Wernham, Journ. Bot. Brit. & For. 51: 219. 1913.

***Duggena leptantha* (A. Rich.) Standley.**

Gonzalea leptantha A. Rich. in Sagra, Hist. Cuba 11: 16. 1850.

Gonzalagunia leptantha Urban, Symb. Antill. 7: 400. 1912.

***Duggena mollis* (Spruce) Standley.**

Gonzalagunia mollis Spruce; Schum. in Mart. Fl. Bras. 6^o: 290. 1889.

Gonzalea mollis Spruce; Schum. in Mart. Fl. Bras. 6^o: 291. 1889, as synonym;

Wernham, Journ. Bot. Brit. & For. 51: 219. 1913.

The type collection is the same in both places of publication cited above; Mr. Wernham, however, makes no reference to the earlier publication of the species by Schumann.

***Duggena nivea* (Bartling) Standley.**

Gonzalea nivea Bartling; DC. Prodr. 4: 436. 1830.

Gonzalagunia nivea Kuntze, Rev. Gen. Pl. 1: 284. 1891.

Duggena ovatifolia (Donn. Smith) Standley.*Gonzalea ovatifolia* Donn. Smith, Bot. Gaz. **27**: 336 1899.*Gonzalagunia ovatifolia* Robinson, Proc. Amer. Acad. **45**: 405. 1910.**Duggena panamensis** (Cav.) Standley.*Buena panamensis* Cav. Icon. Pl. **6**: 50. *pl.* 571. 1801.*Gonzalea panamensis* Pers. Syn. Pl. **1**: 133. 1805.**Duggena petesia** (Griseb.) Standley.*Gonzalea petesia* Griseb. Mem. Amer. Acad. n. ser. **8**: 504. 1863.*Gonzalagunia petesia* Robinson, Proc. Amer. Acad. **45**: 405. 1910.**Duggena pulverulenta** (Humb. & Bonpl.) Standley.*Gonzalea pulverulenta* Humb. & Bonpl. Pl. Aequin. **1**: 228. 1808.*Gonzalagunia pulverulenta* Kuntze, Rev. Gen. Pl. **1**: 284. 1891.**Duggena rugosa** Standley.*Gonzalagunia rugosa* Standley, Contr. U. S. Nat. Herb. **17**: 446. 1914.**Duggena sagraeana** (Urban) Standley.*Gonzalagunia sagraeana* Urban, Symb. Antill. **7**: 399. 1912.**Duggena spicata** (Lam.) Standley.*Lygistum spicatum* Lam. Tabl. Encycl. **1**: 286. 1791.*Gonzalea spicata* DC. Prodr. **4**: 437. 1830.**Duggena thyrsoides** (Donn. Smith) Standley.*Gonzalea thyrsoides* Donn. Smith, Bot. Gaz. **13**: 188. 1888.*Gonzalagunia thyrsoides* Robinson, Proc. Amer. Acad. **45**: 405. 1910.**Duggena tomentosa** (Humb. & Bonpl.) Standley.*Gonzalea tomentosa* Humb. & Bonpl. Pl. Aequin. **1**: 225. *pl.* 64. 1808.*Gonzalagunia tomentosa* Kuntze, Rev. Gen. Pl. **1**: 284. 1891.**NEW OR NOTABLE SPECIES OF ARCYTOPHYLLUM.**

The genus *Arcytophyllum*, a member of the Rubiaceae, is represented by some 20 species, confined chiefly to the high mountains of northern South America. Several species are contained in the recent collections of Mr. Pittier in Colombia and Venezuela, two of which are undescribed. The species found in Costa Rica and Panama was given a manuscript name several years ago by Dr. Schumann, but this has never been formally published. A diagnosis of it is given in the present paper. There are included also transfers of 4 species previously published under other generic names.

Arcytophyllum capitatum (Benth.) Standley.*Rhachicallis capitata* Benth. Pl. Hartw. 195. 1845.*Hedyotis capitata* Walp. Repert. Bot. **6**: 56. 1846, not Lam.*Hedyotis hartwegiana* Wedd. Chlor. And. **2**: 45. 1857.

Collected by Hartweg (no. 1070) in the Province of Popayán, Colombia.

Arcytophyllum caracasana (H. B. K.) Standley.*Hedyotis caracasana* H. B. K. Nov. Gen. & Sp. **3**: 393. 1818.*Rachicallis caracasana* DC. Prodr. **4**: 434. 1830.

First found by Bonpland on the Silla de Caracas, Venezuela, and collected by Otto Kuntze at the same locality in 1874. The species was collected by Mr. H. Pittier (no. 6237) in the upper belt of Pico de Naiguatá, State of Miranda, Venezuela, on the southern slope at an altitude of 2,400 to 2,765 meters, in May, 1913. Here, too, appar-

ently, belong specimens collected by Pittier (no. 1114) in the Páramo de Buena Vista, Huila Group, Central Cordillera, State of Cauca, Colombia, at an altitude of 3,000 to 3,600 meters. The Colombian plant has rather narrower leaves than the Venezuelan one but does not seem to differ otherwise.

***Arcytophyllum caucanum* Standley, sp. nov.**

Low, much branched shrub, 20 to 30 cm. high; branches stout, quadrangular, glabrous, or scabro-ciliate along the angles, erect or strongly ascending; leaves numerous, crowded; stipules broadly ovate, divided into several bristle-like laciniae at the apex; leaf blades 6 mm. long and 3 mm. wide, oval, obtuse or acutish, mucronulate, nearly flat, margined, thick and coriaceous, glabrous, abruptly contracted at the base into a very short petiole; flowers short-pedicelled, in subsessile few-flowered terminal clusters; pedicels glabrous; calyx 4 to 5 mm. long, the lobes triangular-oblong, acute or acuminate, much longer than the tube, with intermediate setose appendages nearly as long as the lobes; corolla tube 5 to 7 mm. long, much exceeding the lobes, these triangular-ovate, acute, pilose within with fine short hairs; capsule about 2 mm. high.

Type in the U. S. National Herbarium, no. 531334, collected in the Páramo de Buena Vista, Huila Group, Central Cordillera, State of Cauca, Colombia, at an altitude of 3,000 to 3,600 meters, January, 1906, by H. Pittier (no. 1137). Also collected in the Páramo de Moras, between Mozoco and Pitayó, in the same State, at a similar altitude, February, 1906, by Mr. Pittier (no. 1412).

Related to *A. capitatum* but differing in the smaller, less acute leaves, the larger flowers which surpass the leaves, and the proportionally longer corolla tube.

***Arcytophyllum cephalanthum* (Wedd.) Standley.**

Hedyotis cephalantha Wedd. Chlor. And. 2: 46. 1857.

This was based by Weddell upon three collections from the provinces of Pamplona and Ocaña, Colombia. Weddell states that it is perhaps the largest of the species, the leaves being often 2 cm. long.

***Arcytophyllum latifolium* Standley, sp. nov.**

Low shrub; stems erect, branched, stout, glabrous, yellowish, obtusely quadrangular; leaves numerous but scarcely crowded; leaf blades 10 to 14 mm. long, 5 to 8 mm. wide, broadly ovate or ovate-oblong, broadly obtuse, mucronulate, glabrous, thick and coriaceous, the margins usually strongly revolute, abruptly contracted at the base into a very short petiole; stipules broadly ovate, rounded at the apex and dissected into setose laciniae, scarious, stramineous, conspicuous; flowers nearly sessile in dense few-flowered terminal clusters; calyx 3 mm. long, the lobes lanceolate or lance-oblong, acute, twice as long as the tube or more, with intermediate setose appendages much shorter than the lobes; flowers surpassing the leaves; corolla tube 3 to 4 mm. long, only slightly longer than the ovate acutish lobes, these abundantly pubescent within with short, white, very coarse hairs; capsules not seen.

Type in the U. S. National Herbarium, no. 531356, collected in the Páramo de Buena Vista, Huila Group, Central Cordillera, State of Cauca, Colombia, at an altitude of 3,000 to 3,600 meters, January, 1906, by H. Pittier (no. 1159).

Nearest *A. capitatum* and *A. caucanum*; differing from the former in its smaller obtuse leaves and larger flowers, and from the latter in the broader, more obtuse leaves with revolute margins and in the shorter corolla tube. The pubescence of the corolla is very different in *A. caucanum* and *A. latifolium*.

***Arcytophyllum lavarum* Schum. sp. nov.**

* *Mallostoma lavarum* Donn. Smith, Enum. Pl. Guat. 5: 36. 1899, hyponym.

Arcytophyllum lavarum Schum. loc. cit. as synonym.

Low, much branched shrub, 12 to 25 cm. high; branches stout, erect, glabrous, quadrangular; leaves numerous, dense; stipules about 1 mm. long, triangular-ovate, acuminate, papillose on the outer surface or smooth, with usually 2 laciniae on each

side near the apex; leaves 4 to 6 mm. long, 2 to 3 mm. wide, oblong to oblong-ovate or oval, obtuse or rounded at the apex, thick and coriaceous, glabrous, flat or nearly so, shining on the upper surface, abruptly contracted at the base into a very short petiole; flowers few, short-pediceled, in solitary or clustered, pedunculate, terminal cymes; pedicels glabrous; calyx 2 mm. long, glabrous, thick and firm, the lobes oblong to oval or ovate, obtuse or acutish, longer than the tube, with low and inconspicuous intermediate lobes; corolla tube 3.5 mm. long, much longer than the lobes, these densely pilose within with coarse white hairs; capsule 2 mm. long.

Type in the U. S. National Herbarium, no. 675707, collected on bare rock slopes at the summit of Chiriquí Volcano, Panama, at an altitude of 3,374 meters, March 12, 1911, by William R. Maxon (no. 5349).

ADDITIONAL SPECIMENS EXAMINED:

PANAMA: Volcán de Chiriquí, April, 1899, *K. Sapper*.

COSTA RICA: Volcán de Poás, Province of Alajuela, alt. 2,700 meters, *J. D. Smith* 6635. Volcán de Turrialba, Province of Cartago, alt. 2,800 meters, *Pittier* (J. D. Smith, no. 7506; Inst. Fís. Geogr. Costa Rica, no. 13239).

Related to *A. hartwegianum* and *A. cephalanthum*, of Colombia, by its pubescent corollas, but readily distinguished by its small, obtuse leaves and loose inflorescence. Only one other species of the genus is known from Central America, *A. shannoni*, described from Guatemala.

Arcytophyllum shannoni (Donn. Smith) Standley.

Mallostoma shannoni Donn. Smith, Bot. Gaz. 18: 203. 1893.

NEW SPECIES OF PSYCHOTRIA FROM PANAMA.

Psychotria is represented in Panama by a larger number of species than any other genus of the Rubiaceae. At present 26 species are known from the region, but when remote parts of the country are explored this number will doubtless be greatly increased. An excellent account of the West Indian *Psychotrias* by Dr. Urban has appeared recently,¹ which has been of great service in the study of the Panamanian species. Most of the forms found in Panama are confined, so far as known, to continental North America, and probably many of them are endemic.

Psychotria aggregata Standley, sp. nov.

Branches stout, succulent, glabrous, lineolate; stipules united at the base, green, each abruptly contracted into a narrowly oblong tip 3 mm. long; petioles 3 to 3.5 cm. long; leaf blades oblanceolate, 12 to 20 cm. long, 3 to 5 cm. wide, acuminate, attenuate at the base, subcoriaceous, glabrous, dull green on the upper surface, whitish beneath, prominently veined, the veins coarse, white beneath; peduncles axillary, 4 to 5 cm. long, minutely puberulent, bearing mostly 3 pedunculate, densely many-flowered heads, the heads composed of few-flowered fascicles each subtended by several narrowly oblong to ovate, acute or acutish, ciliolate, green bracts, these equaling or slightly exceeding the calyces; calyx and ovary subequal in length, together 3 mm. long, the calyx lobed to the middle, whitish, the lobes ovate, obtuse or acutish, minutely and sparsely puberulent; corolla white, 4 mm. long, puberulent outside, the tube dilated upward, the lobes very short, hooded; fruit not seen.

Type in the U. S. National Herbarium, no. 677655, collected in the humid forest, between Alto de las Palmas and top of Cerro de la Horqueta, Chiriquí, Panama, at an altitude of 2,100 to 2,260 meters, March 18, 1911, by H. Pittier (no. 3264).

¹ Urban, Symb. Antill. 7: 433-477. 1913.

Readily distinguished from the other species with axillary inflorescence by its numerous small, densely clustered flowers, large green bracts, whitish calyx, and conspicuously hooded corolla lobes.

***Psychotria calophylla* Standley, sp. nov.**

Young branches stout, obtusely angled, short-villous with short soft spreading multicellular ferruginous hairs; stipules not seen, deciduous; petioles stout, 1 to 2.5 cm. long, pubescent like the branches; leaf blades broadly obovate or rounded-obovate, 16 to 22 cm. long, 7.5 to 12 cm. wide, rounded at the apex and short-apiculate, the apex broadly triangular, acute or acutish, rather abruptly long-acuminate or attenuate at the base, firmly herbaceous, glabrous on the upper surface, densely pubescent beneath along the veins with short soft ferruginous hairs, softly ferrugino-puberulent between the veins, the veins conspicuous beneath but slender, 11 to 13 lateral ones on each side; inflorescence sessile, 7 cm. long, and about 12 cm. wide, loosely branched, the branches short, spreading or divaricate, densely short-villous with ferruginous hairs; flowers sessile, capitate at the ends of the branches; ovary and calyx together 3.5 to 5 mm. long, densely ferrugino-pubescent with short soft fine multicellular hairs, the calyx limb shallowly and obtusely lobed; corolla not seen; fruit sharply 12-costate, about 12 mm. long, the seeds not sulcate on the inner surface.

Type in the U. S. National Herbarium, no. 48568, collected in the vicinity of Chagres, Isthmus of Panama, March 15, 1850, by August Fendler (no. 60). Duplicate in the Gray Herbarium.

Well marked by the large, broad leaves, soft, ferruginous pubescence, sessile inflorescence, and large fruit.

***Psychotria chiriquina* Standley, sp. nov.**

Shrub 3 meters high, glabrous throughout; branches stout, succulent, densely leafy, the internodes 4 to 10 mm. long; stipules 6 mm. long, oblong-ovate, obtuse, united only at the base, reddish brown, early deciduous; petioles stout, 3 to 6 mm. long; leaf blades elliptic or oblong-elliptic, 4.5 to 6.5 cm. long, 1 to 2 cm. wide, acuminate to an obtuse tip, acuminate at the base, subcoriaceous, rather pale green, the veins not prominent; peduncles 2 to 2.5 cm. long, terminal, bearing a trichotomous corymb 2 to 3.5 cm. long; pedicels 2 to 3 mm. long, stout; bracts rounded-ovate, 1 mm. long; calyx 1 mm. long, the limb subentire; corolla white, 5 mm. long, the tube stout, the lobes oblong, obtuse, leathery, one-third to half as long as the tube, appendaged outside below the apex, spreading, densely bearded in the throat; anthers oblong, nearly sessile; style glabrous; fruit not seen.

Type in the U. S. National Herbarium, no. 677509, collected on Alto de la Cuesta, eastern slope of Chiriquí Volcano, Panama, at an altitude of 2,100 to 2,200 meters, March 10 to 13, 1911, by H. Pittier (no. 3118).

Remarkable for the densely leafy branches, firm leaves, and subentire calyx.

***Psychotria fendleri* Standley, sp. nov.**

Branches stout, nearly terete, glabrous; stipules united only at the base, broadly ovate to oblong, 7 to 9 mm. long, entire, obtuse, brown, soon deciduous, glabrous; petioles very stout, 2 to 5 mm. long; leaf blades broadly obovate to oval-obovate, 5 to 9 cm. long, 2.5 to 5 cm. wide, rounded at the apex and very broadly apiculate, the apex obtuse or abruptly acutish, acute or broadly cuneate at the base, coriaceous, glabrous, pale green, the margins often revolute, the veins conspicuous beneath, the lateral ones 7 to 9 on each side; peduncles terminal, 3.5 to 4 cm. long, stout, glabrous, the primary branches of the inflorescence 3 to 5, about 7 mm. long, each bearing several short-pedunculate clusters of sessile or short-pedicellate flowers; bracts subtending the primary branches of the inflorescence 5 to 6 mm. long, lance-oblong, acute, thin, brown; calyx and ovary glabrous, together 2.5 mm. long, the calyx shallowly and

broadly dentate; corolla 5 mm. long, glabrous outside, the lobes shorter than the tube, oblong, obtuse; fruit not seen.

Type in the U. S. National Herbarium, no. 48567, collected in the vicinity of Chagres, Panama, February 25, 1850, by August Fendler (no. 59). Duplicate in the Gray Herbarium.

Here also belongs a specimen from the region of Santa Marta, Colombia, at an altitude of 600 meters, collected by Herbert H. Smith (no. 1832). In this some of the leaves are as much as 11.5 cm. long, the inflorescence is more open and much branched, 5 to 7 cm. long, and the corolla is densely villous in the throat. The Colombian collection was distributed as *Psychotria granadensis* Benth., a species originally described from Nicaragua, but that is characterized as having shorter stipules, much longer, narrower leaves, subsessile inflorescence, and longer corolla lobes.

***Psychotria goldmanii* Standley, sp. nov.**

Shrub; branches slender, subterete, glabrous; stipules united, green, firm, persistent, bilobate, the lobes short, lance-subulate; petioles slender, 3 to 8 mm. long; leaf blades elliptic to elliptic-oblong, 3.5 to 8 cm. long, 0.8 to 1.5 cm. wide, abruptly long-attenuate, the tip nearly linear, 5 to 12 mm. long, obtuse, acuminate, or cuneate at the base, firmly herbaceous, deep green and glabrous on the upper surface, pale beneath and sometimes puberulent along the veins, these conspicuous, the lateral ones parallel, with finer veins between them; inflorescence terminal, the slender peduncles about 2 cm. long, bearing a corymbose panicle 2.5 to 3 cm. high and of about the same breadth, the branches ascending, sparsely puberulent; flowers sessile or subsessile, clustered at the ends of the peduncles, each cluster subtended by 2 connate ovate acute bracts, the bracts subtending the branches of the inflorescence linear, 2 to 4 mm. long; calyx longer than the ovary, the lobes shorter than the tube, ovate to oblong, obtuse or acute; corolla 5 mm. long, glabrous outside, the tube dilated above the middle, the lobes scarcely 1 mm. long, obtuse, erect; fruit 4 mm. high, compressed, conspicuously costate, glabrous.

Type in the U. S. National Herbarium, no. 716141, collected at the head of Río Limón, Mount Pírre, Province of Panama, Panama, at an altitude of 1,500 meters, March 6, 1912, by E. A. Goldman (no. 1883).

Very distinct in the pale lower surface of the leaves and the short corolla lobes. In general appearance the plant resembles the Brazilian *Psychotria leiocarpa*.

***Psychotria insignis* Standley, sp. nov.**

Branches woody, the young ones stout, obtusely angled, densely short-pubescent with dark ferruginous spreading hairs; stipules distinct, soon deciduous, 1.5 cm. long, oblong, acutish, thin, densely short-pubescent outside; petioles 2.5 to 5 cm. long, stout; leaf blades ovate to oblong or oval, 14 to 22 cm. long, 7 to 9 cm. wide, gradually acuminate, cordate or subcordate at the base, herbaceous, glabrous on the upper surface except along the midvein, there short-pubescent, densely short-pubescent beneath along the veins with rigid spreading ferruginous hairs, very finely pubescent elsewhere, prominently veined beneath, the lateral veins 17 to 20 on each side, parallel, arcuate, anastomosing to form a vein near the margin; inflorescence terminal, sessile, 5-rayed at the base, each branch bearing 3 or more peduncled heads of sessile flowers, the branches densely pubescent with short spreading ferruginous hairs; flowers numerous in each head; calyx 2 mm. long, 5-lobed to the middle, the lobes oblong, obtuse or rounded at the apex, densely pubescent outside; ovary shorter than the calyx, densely covered with short soft ferruginous hairs; mature corollas not seen, those in bud pubescent outside with short stiff white hairs; fruit not seen.

Type in the U. S. National Herbarium, no. 679567, collected on the hills of Sperdi, near Puerto Obaldía, San Blas Coast, Panama, at an altitude of 20 to 200 meters, September, 1911, by H. Pittier (no. 4410).

Remarkable for the large, obtuse calyx lobes, and especially for the cordate leaves.

***Psychotria albonervia* Standley, sp. nov.**

Shrub; young branches stout, obscurely angled, green, glabrous; stipules distinct, 12 to 17 mm. long, 6 to 8 mm. wide, coriaceous, green tinged with purple, conspicuously parallel-veined, soon deciduous, each 2-lobed to the middle, the lobes narrowly lanceolate, acuminate, ciliolate; petioles 5 to 15 mm. long, stout, leaf blades narrowly oblong-oval to elliptic-oblong or rarely obovate, 10 to 16 cm. long, 2.5 to 6 cm. wide, abruptly acuminate or attenuate, obtuse and somewhat decurrent to cuneate at the base, coriaceous, bright green, shining, and glabrous on the upper surface, beneath paler, glabrous except along the veins, these very conspicuous, broad, white, minutely ciliolate, the lateral ones 17 to 25 on each side, parallel, anastomosing to form an irregular marginal vein; peduncles terminal, 3 to 5.5 cm. long, glabrous, the inflorescence thyrsoid-paniculate, 3 to 6 cm. long, 3 to 5.5 cm. wide, the main branches verticillate, divaricate, stout, sparsely pubescent with short spreading white hairs; flowers clustered at the ends of the peduncles, sessile or subsessile; bracts whitish, 6 to 8 mm. long, lanceolate to oblong or oval, obtuse or acutish, ciliolate, prominently veined; calyx very short, the teeth triangular, acute; corolla 8 to 10 mm. long, white, glabrous outside, villous within near the base, the tube 1.5 to 2 mm. in diameter, the lobes oblong to broadly ovate, half as long as the tube, obtuse or acutish; filaments elongate, the anthers exserted; fruit not seen.

Type in the U. S. National Herbarium, no. 47282, collected in the vicinity of Chagres, Panama, in February or March, 1850, by August Fendler (no. 62). Another specimen of the same collection is in the Gray Herbarium.

Also collected in the Sabana de Marcelito near El Vigía, Panama, on edge of forest, January 12, 1911 (*Pittier* 2379).

This finds its nearest ally in *Psychotria arcuata* Benth.,¹ described from British Guiana, but occurring also in Grenada, Tobago, and Trinidad, according to Urban,² and in Brazil, according to Schumann.³ Schumann considers *P. arcuata* a synonym of *P. inundata* Benth., published at the same time, but specimens of the type collections in the U. S. National Herbarium appear to represent distinct species. *Psychotria arcuata* is distinguished from the Panamanian species here proposed as new by the very different persistent stipules and the thinner, smaller leaves.

***Psychotria magna* Standley, sp. nov.**

A shrub 3 meters high; young branches stout, obtusely angled, minutely puberulent or glabrate; stipules not seen, evidently soon deciduous; petioles stout, 2 to 4 cm. long, glabrous; leaf blades oval or elliptic-oval, 18 to 25 cm. long, 8 to 11.5 cm. wide, abruptly caudate or attenuate from an obtuse apex, the tip narrowly triangular, 2 to 3 cm. long, obtuse or broadly cuneate at the base, herbaceous, drying dark brown, glabrous, or very minutely puberulent on the veins beneath, the lateral veins prominent, 17 to 20 on each side, parallel, scarcely anastomosing at the margin; inflorescence terminal, cymose-paniculate, sessile, about 10 cm. long and broad, much branched, the branches spreading, very minutely puberulent; flowers sessile, capitate at the ends of the peduncles; no bracts seen; calyx and ovary together 1.5 mm. long, the limb of the calyx undulate, ciliolate; corolla yellowish white, 3 to 4 mm. long, glabrous outside, densely white-villous within, the tube thick, the lobes as long as the tube, oblong or ovate-oblong, obtuse or acutish, spreading; filaments stout, elongate, the anthers exserted; fruit not seen.

Type in the U. S. National Herbarium, no. 679188, collected in forests, Loma de la Gloria, near Fató, Province of Colón, Panama, at an altitude of 10 to 100 meters, August, 1911, by H. Pittier (no. 4092).

¹ Journ. Bot. Hook. 3: 229. 1841.

² Symb. Antill. 7: 475. 1913.

³ In Mart. Fl. Bras. 6^e: 310. 1881.

Without stipules and fruit it is impossible to determine the true position of this plant, but it seems to be different from all the species ascribed to Central America or northern South America. It is well distinguished by the very large, caudate leaves.

***Psychotria panamensis* Standley, sp. nov.**

Small tree with glabrous leaves and branches; stipules 4 to 6 mm. long, united only at the base, broadly ovate or oval, entire, obtuse, thick and leathery, deciduous, short-pubescent on the inner surface near the margins; petioles 1 to 2 cm. long; leaf blades obovate to obovate-oblong, rarely ovate, 5.5 to 10 cm. long, 2 to 4 cm. wide, obtuse or rarely acutish, firmly herbaceous, dull green, rather prominently veined beneath; peduncles 1 to 1.5 cm. long, stout, the inflorescence corymbose-paniculate, 4 to 5.5 cm. long, many-flowered, the branches minutely puberulent; flowers capitate at the ends of the branches, subsessile before anthesis, but the stout pedicels in fruit 3 to 4 mm. long; bracts early deciduous; calyx 1.5 mm. long and fully as broad, the limb subentire, ciliolate; developed corollas not seen, those in bud glabrous outside; fruit globose, 7 mm. high, obtusely costate, glabrous; seeds 5 mm. long, smooth, not sulcate on the inner surface.

Type in the U. S. National Herbarium, no. 677588, collected in the humid forest around Los Sigüas Camp, southern slope of Cerro de la Horqueta, Chiriquí, Panama, at an altitude of 1,700 meters, March 17 to 19, 1911, by H. Pittier (no. 3194).

Related, apparently, to *Psychotria carthaginensis*, but distinguished by the large fruit, longer petioles, and obtuse leaves.

***Psychotria peperomiae* Standley, sp. nov.**

A low shrub, glabrous throughout; stems stout, the younger ones succulent, branched, terete or obtusely angled; stipules 2 mm. long, united to form a truncate sheath, the margin marcescent; petioles 4 to 6 mm. long; leaf blades broadly obovate to obovate-oval, 2.5 to 5 cm. long, 1 to 2.5 cm. wide, obtuse or rounded at the apex, apiculate, the tip 1 to 2 mm. long, acute or cuneate at the base, fleshy, inconspicuously veined; peduncles chiefly terminal, 1 to 2.5 cm. long, slender, bearing a loosely few-flowered corymbose inflorescence; bracts linear, attenuate, brownish, 2 to 3 mm. long; pedicels 2 to 5 mm. long, slender; calyx 1 mm. long, the 4 lobes longer than the tube, ovate-triangular, acute; corolla 5 mm. long, the tube slightly dilated above, the lobes oblong or broadly oblong, about one-third as long as the tube, their tips incurved, the throat glabrous within; anthers nearly sessile, inserted in the throat of the corolla; fruit subglobose, 3 mm. high, nearly smooth.

Type in the U. S. National Herbarium, no. 677632, collected in the humid forest on the top of Cerro de la Horqueta, Chiriquí, Panama, at an altitude of 2,265 meters, March 18, 1911, by H. Pittier (no. 3235).

In general form and in the tetramerous flowers most closely related to *Psychotria crassa* Benth.¹ That species differs in the larger, acuminate leaves, bearded throat of the corolla, and longer corolla lobes.

***Psychotria pittieri* Standley, sp. nov.**

Shrub; young branches slender, densely pubescent with rather long, coarse, white, appressed or spreading hairs; stipules 4 to 6 mm. long, united at the base, bilobate, the lobes linear-subulate; petioles 3 to 5 mm. long, slender, pubescent like the branches; leaf blades elliptic-oval, 4 to 5.5 cm. long, 1.5 to 2.5 cm. wide, abruptly acuminate or attenuate, the tip acute, obtuse to cuneate at the base, herbaceous, deep green on the upper surface except along the midvein, there hirsutulous, pale beneath and finely pubescent with short appressed hairs, conspicuously veined, the lateral veins parallel with many finer veins between them; peduncles terminal, 1.5 cm. long, slender, densely covered with soft white hairs, bearing few-flowered panicles about 2 cm. long; flowers clustered at the ends of the branches, subsessile; bracts small, linear; calyx 1

¹ Journ. Bot. Hook. 3: 227. 1841.

mm. long, densely appressed-pubescent with white hairs, the lobes rounded-ovate, obtuse; corolla white, 4 to 5 mm. long, appressed-pubescent outside, the lobes triangular-oblong, acute, about as long as the tube, spreading; fruit not seen.

Type in the U. S. National Herbarium, no. 676523, collected in forest between Gorgona and Gatún, Canal Zone, Panama, at an altitude of 10 to 50 meters, January 7, 1911, by H. Pittier (no. 2266).

Peculiar in the long whitish pubescence of the stems and inflorescence, the appressed pubescence of the leaves, and the short, oblong inflorescence.

Psychotria psychotriaefolia (Seem.) Standley.

Cephaelis psychotriaefolia Seem. Bot. Voy. Herald 138. 1852-7.

TYPE LOCALITY: "In dense forests near Cruces, Province of Panama, and Chirambira, Darien."

DISTRIBUTION: Panama.

Shrub; young branches and inflorescence ferrugino-tomentulose; stipules united, thin, brown, deciduous, 1.5 to 2 cm. long, abruptly long-attenuate, ciliate, the apex usually bifid; leaf blades very shortly petiolate, obovate to obovate-oblong, 9 to 17 cm. long, acute or short-acuminate, cuneate at the base, glabrous above, puberulent beneath, at least along the veins; inflorescence axillary or rarely terminal, sessile, the branches 1 to 6, 2 cm. long or less, each bearing 1 or several heads of sessile flowers, each head subtended by several more or less united bracts; corolla 3 mm. long; fruit 4 to 5 mm. long, glabrous.

PANAMA: Without locality, *Seemann* (Gray Herb.). Chagres, *Fendler* 58. Gatún, *Hayes* (Gray Herb.).

Several sheets of some of the above collections have been examined. They do not agree in all respects with the original description, especially in the axillary inflorescence. It seems probable, however, that Seemann described the species from young material, which might account for some of the discrepancies.

NEW SPECIES OF RUBIACEAE OF SEVERAL GENERA, CHIEFLY FROM PANAMA.

The species described below are chiefly based upon the collections made in Panama, but a few are from other parts of tropical America. Two of the species, *Cassupa panamensis* and *Stachyarrhena heterochroa*, are of particular interest because they represent genera not previously reported from North America.

Basanacantha subcordata Standley, sp. nov.

Shrub or small tree with sweet-scented white flowers; branches slender, divaricate, glabrous, each bearing near the apex 2 slender or stout spines 5 to 7 mm. long; stipules free, 6 to 8 mm. long, ovate to oblong, obtuse or acute, mucronate, glabrous outside, densely white-sericeous within; petioles slender, 10 to 25 mm. long, canescent; leaf blades thin, dull green, oblong to ovate or broadly oval-ovate, 4 to 10 cm. long, 2.5 to 6 cm. wide, very unequal, acute or abruptly acute, rarely obtuse, with a subulate tip 1 to 2 mm. long, from rounded to cordate at the base, somewhat decurrent upon the petiole, strigillose or scaberulous on the upper surface, abundantly strigose and scabrous beneath; staminate flowers 2 or more together at the end of the branches, sessile, the calyx tubular-campanulate, 7 mm. high, with 5 subulate lobes about 5 mm. long, abundantly pubescent, with long whitish appressed hairs; corolla tube 5 to 6 cm. long, slender, abundantly hirtellous outside, the lobes 2.5 to 4 cm. long, ovate or lanceolate, attenuate, sparingly pubescent; anthers slightly exserted; pistillate flowers solitary at the ends of the branches; ovary densely tomentose, the calyx tube tubular-campanulate, 6 mm. long, densely pubescent with whitish hairs, the lobes linear,

15 to 18 mm. long, acuminate to a subulate tip, narrowed toward the base, sparingly pubescent; corolla tube 45 mm. long, scabro-hirtellous; fruit not seen.

Type in the U. S. National Herbarium, no. 861251, collected in thickets and along roadsides near Nicoya, Costa Rica, May, 1900, by A. Tonduz (Inst. Fis. Geogr. Costa Rica, no. 13934). The specimens on this sheet bear staminate flowers. The description of the pistillate flowers is based upon a specimen mounted on sheet 474620, collected near Las Huacas, Nicoya Peninsula, Costa Rica, altitude 900 meters, May 24, 1903, by O. F. Cook and C. B. Doyle (no. 724).

The only closely related species described from Central America is *Basanacantha monantha* (Benth.) Hook. f., the type locality of which is Guatemala. That has thickish, differently shaped leaves, and a very different calyx and corolla. The native name of the Costa Rican plant is "crucilla."

***Basanacantha pitteri* Standley, sp. nov.**

Branches stout, spreading, glabrous, grayish brown, with numerous light-colored lenticels; stipules distinct, broadly ovate, acutish, thin, brown, glabrous outside, densely silky-pilose within with white hairs; petioles stout, 9 to 14 mm. long, densely pubescent with stiff stout spreading tawny hairs; leaf blades broadly obovate or oval, 12 to 46 cm. long, 7 to 10 cm. wide, abruptly acute, with a subulate tip 1 to 2 mm. long, rounded at the base, thin, dull green, loosely strigose above, slightly paler beneath and densely pubescent with long slender stiff loose hairs; only staminate flowers seen, these few together at the ends of the branches; calyx tube campanulate, 4 mm. long, the lobes subulate, of about the same length, the whole calyx glabrous except for a few long slender white hairs on the lobes and about the margin of the tube; corolla white, the tube 6 cm. long, slender, slightly dilated in the throat, glabrous outside, villous within, the lobes lanceolate or elliptic-lanceolate, 25 to 30 mm. long, long-attenuate; anthers linear, sessile in the throat of the corolla, 1 cm. long; style slender, 45 mm. long, glabrous.

Type in the U. S. National Herbarium, no. 578473, collected at Zent Junction, near Matina, Costa Rica, February, 1900, by H. Pittier (Inst. Fis. Geogr. Costa Rica, no. 16036).

There is a well developed style present in all of the flowers, but it appears to be abortive, and the form of the calyx and the sterile ovary shows very plainly that the flowers are not fertile. In general appearance *B. pitteri* is similar to the preceding species, but it differs conspicuously in the nearly glabrous calyx, glabrous corolla, larger, broader leaves, and short petioles.

***Basanacantha lasiantha* Standley, sp. nov.**

Branches rather slender, glabrous, divaricately branched, each bearing near the end 2 short stout spines 6 mm. long; stipules distinct, 6 to 8 mm. long, ovate or ovate-oblong, obtuse, glabrous outside, densely pilose within; petioles slender, 6 to 15 mm. long, tomentose; leaf blades broadly obovate, thin, 7 to 12 cm. long, 3.5 to 6.5 cm. wide, acute, sometimes abruptly so, acute or rounded at the base, abundantly scabro-hirtellous on the upper surface, densely pubescent beneath with rather short loose soft whitish hairs, not conspicuously veined; only pistillate corollas seen; corolla tube 6 to 7 cm. long, densely pubescent outside with long soft white appressed hairs, villous within, the 5 lobes narrowly lanceolate, 45 to 70 mm. long, 9 to 12 mm. wide, long-attenuate, more or less sericeous outside, glabrous within; anthers inserted in the throat of the corolla tube, linear, sessile, 10 mm. long.

Type in the U. S. National Herbarium, no. 678517, collected in forests on dry limestone around Alhajuela, Chagres Valley, Province of Panama, Panama, altitude 30 to 100 meters, May 12 to 15, 1911, by H. Pittier (no. 3473).

The specimens are incomplete, the flowers being represented only by staminate corollas, no calyx being present. This is perhaps nearest *Basanacantha monantha*, but

the form of the corolla is altogether different, the flowers being much larger than those of other members of the genus.

Cassupa panamensis Standley, sp. nov.

A small tree; young branches stout, obtusely quadrangular, densely tomentose with short tawny hairs; stipules 10 to 12 mm. long, triangular-oblong, acuminate, ciliate; petioles stout, 3 to 6.5 cm. long, cinereous-puberulent; leaf blades oval or oval-obovate, 26 to 34 cm. long, 12 to 17 cm. wide, abruptly acuminate, the tips 25 to 30 mm. long, obtuse, shortly acuminate at the base, coriaceous, rugose, dark green on the upper surface and glabrous except for the puberulent veins, the lower surface densely white-puberulent, appearing tomentose, the lateral veins conspicuous, parallel, 18 to 20 on each side, the secondary veins finely reticulate; inflorescence a many-flowered thyriform panicle 15 to 19 cm. long and about 11 cm. wide, on a stout peduncle 5 cm. long, or a few flowering branches present at the base of the peduncle, the branches of the inflorescence ascending, stout, compressed, 25 to 35 mm. long, densely hirtellous or tomentose with tawny hairs, the terminal flower sessile, the others on stout compressed pedicels 5 to 10 mm. long; bracts ovate, acute, 2 to 3 mm. long, ciliate, puberulent outside; calyx 1.5 to 2 mm. high, obscurely repand-dentate, ciliolate, glabrous; corolla white, the tube 52 mm. long, slightly dilated in the throat, finely and sparsely puberulent outside and verrucose, villous within the throat; corolla lobes 6, oblong, 11 mm. long, 4.5 mm. wide or less, obtuse or acute, imbricated before anthesis, puberulent outside and within, bearded at the base; filaments 3 mm. long, inserted 28 mm. above the base of the tube; anthers 9 mm. long, abruptly acuminate at the apex; style slender, 32 mm. long, scaberulo-puberulent; stigma oblong, 5 mm. long; fruit elongate-globose, 8 or 9 mm. in diameter, 10 mm. high, 2-celled, smooth, glabrous; seeds numerous, 1 mm. in diameter, foveolate.

Type in the U. S. National Herbarium, no. 678965, collected along the Río Fató, Province of Colón, Panama, altitude 10 to 100 meters, July and August, 1911, by H. Pittier (no. 3889). Additional material is mounted on sheet 678964.

This is the first species of the genus to be reported north of Colombia. It is related to *Cassupa alba* Schum. & Krause, described from the mountains of the interior of Colombia, but is distinguished by the longer corollas, which are tuberculate and puberulent outside rather than smooth and glabrous. The inflorescence is considerably narrower than that described for *C. alba*, but this may be an individual variation.

Chomelia boliviana Standley, sp. nov.

Chomelia tenuiflora Benth.; Rusby, Mem. Torrey Club 3^d: 45. 1893, not Benth. Journ. Bot. Hook. 3: 235. 1841.

Branches slender, terete, grayish brown, the younger ones pubescent with short loose yellowish hairs, the older ones glabrate, furnished with numerous slender or stout spines 7 to 22 mm. long; stipules not seen, early deciduous; petioles slender, 5 to 12 mm. long; leaf blades elliptic-oval to elliptic-oblong, 4 to 9 cm. long, 15 to 30 mm. wide, acute or abruptly acuminate at the apex, acuminate or attenuate at the base, thin, bright green on both surfaces, sparsely pubescent on the upper surface with short fine appressed hairs, abundantly pubescent beneath, especially along the veins, with slender appressed hairs, the lateral veins prominent; peduncles axillary, 3 to 5 cm. long, densely pubescent, bearing numerous sessile or subsessile flowers in a loosely branched cyme; bracts subulate, 2 to 3 mm. long; calyx 2 mm. long, densely appressed-pubescent, the 4 teeth unequal, about equaling the tube, narrowly triangular, acute; corolla tube slender, 12 to 20 mm. long, densely sericeous, the lobes 4 to 5 mm. long, oblong to oblong-ovate, acute or obtuse.

Type in the U. S. National Herbarium, no. 46974, collected near Yungas, Bolivia, in 1890, by Miguel Bang (no. 342). Also collected between Tipuani and Guanai, Bolivia, by Bang in December, 1892 (no. 1738).

This was described as a new species by Rusby in 1893 under the name of *Chomelia tenuiflora* Benth. "in Herb. Kew." Bentham, however, had published a species of this name many years before, based upon Schomburgk's no. 314 from British Guiana. Schomburgk's plant, a specimen of which is found in the U. S. National Herbarium, is similar in general appearance to the present species, but is easily distinguished by the few flowers, short peduncles, attenuate corolla lobes, and the long, filiform calyx lobes, twice as long as the tube or much longer. Rusby, at the time of publishing a second species under the same name, lists two other specimens besides Bang's no. 342, namely, Matthews's no. 1944 from Peru and a specimen collected by Pearce at Santa Cruz. It is from one of these, presumably, that Bentham's name was taken. It is not probable that so discriminating a botanist as Bentham would have confused so different a plant with that of British Guiana, and it would seem that there must be some confusion of data in the present instance.

The fruit is not present upon either specimen seen by the writer and was not described by Doctor Rusby in his publication of *Chomelia tenuiflora*, but he described it later¹ from Bang's no. 1738 in the following words:

"Nearly 1 cm. long, 2-2.5 mm. broad, oblong, the base slightly narrower, the apex subtruncate, tipped by the conspicuous cup of the calyx-limb, which about equals the strongly recurved teeth, blackish, minutely hispidulous, irregularly and rather lightly costate, slightly curved."

Chomelia boliviana is related to *C. pohliana* Muell. Arg.,² described from Brazil, but differs in its looser, more ample cymes, abundant pubescence, less acute corolla lobes, and deciduous stipules.

***Chomelia brachyloba* Standley, sp. nov.**

Branches slender, reddish brown, the older ones glabrate, the younger ones finely pubescent with short, appressed, whitish or brownish hairs, armed with few stout sharp spines 6 to 10 mm. long; stipules subulate, 3 to 4 mm. long, brown; leaves numerous, the slender petioles 10 to 12 mm. long; leaf blades elliptic-oval to oval or broadly ovate, 32 to 80 mm. long, 20 to 35 mm. wide, abruptly acute, the tip about 3 mm. long, attenuate or abruptly acute at the base, thin, bright green on both surfaces, sparsely pubescent on the upper surface with rather long, slender, appressed hairs, more abundantly pubescent beneath, especially along the veins, with similar hairs, the lateral veins prominent, parallel; peduncles slender, 17 to 35 mm. long, densely pubescent with fine appressed hairs, bearing a congested cyme of 6 to 10 sessile or subsessile flowers; bracts half as long as the calyx or less; calyx 1.5 to 2 mm. long, densely appressed-pubescent below, sparsely pubescent above, the lobes triangular-ovate to lanceolate, rather obtuse, much shorter than the tube, unequal; corolla tube slender, 14 to 22 mm. long, densely sericeous, the lobes 5 to 6 mm. long, linear or narrowly lanceolate, abruptly attenuate to the slender tips; fruit oblong, 10 to 12 mm. long.

Type in the U. S. National Herbarium, no. 679833, collected in the Sabana de Juan Corso, near Chepo, Province of Panama, Panama, at an altitude of 60 to 80 meters, October, 1911, by H. Pittier (no. 4673).

Here belongs also a specimen collected in the region of Santa Marta, Colombia, at an altitude of 45 meters, by H. H. Smith (no. 392). This collection was distributed as *C. tenuiflora* Benth. Comparison of these two specimens with one of the type collection of *C. tenuiflora*, Schomburgk's no. 314 from British Guiana, in the U. S. National Herbarium, shows that the proposed species is well distinguished by its long peduncles, numerous flowers, short spines, and more abundant pubescence, and especially by the short calyx lobes. In *C. tenuiflora* the calyx lobes are filiform-subulate and twice as

¹ Mem. Torrey Club 6: 48. 1896.

² See Mart. Fl. Bras. 6⁵: 34. pl. 4. 1881.

long as the tube or even longer. *Chomelia brachyloba* is also related to *C. filipes* Benth., described from Nicaragua, but that species is described as having smaller, fewer flowers, shorter peduncles, and different pubescence. To the present species is probably to be referred Seemann's no. 341, collected near Panama City and reported by Hemsley as *C. tenuiflora*.¹

Cosmibuena ovalis Standley, sp. nov.

Young branches stout, somewhat fleshy, pale brown; petioles 15 to 25 mm. long; leaf blades oval to broadly oval-obovate, 10 to 14 cm. long, 6 to 8 cm. broad, rounded at the apex, the extreme tip abruptly acute, coriaceous, lustrous above, paler beneath, with 5 to 8 veins on each side, these distant, not conspicuous; inflorescence terminal, 5-flowered; ovary oblong, 12 mm. long, contracted into a stipe of the same or slightly greater length; calyx cylindric, 11 mm. long, with 5 very short, broadly triangular, acute teeth; corolla tube 6 to 7 cm. long, 3.5 to 5 mm. in diameter; corolla lobes narrowly oblong, 25 to 32 mm. long, 9 to 11 mm. wide, rounded at the apex, with short rounded auricles at the base, papillose at the base and short-ciliate; anthers 15 mm. long, subsessile, attached near the base, obtuse, with 2 short appendages at the base; style 65 mm. long, villous above for half its length, the stigma bilamellate, the lamellae thick, 5 to 6 mm. long; ovules with rather short, entire or nearly entire, hyaline appendages.

Type in the U. S. National Herbarium, no. 715202, collected in the vicinity of Olá, Province of Coclé, Panama, altitude 100 to 350 meters, December 7 to 9, 1911, by H. Pittier (no. 5074).

In general appearance this is similar to *Cosmibuena macrocarpa*. The venation of the leaves, however, is very different; the calyx is much larger; and the corolla is larger, with narrow lobes. It does not appear probable that the ovaries would ever develop into a fruit like that figured by Bentham.

Here may belong a specimen in fruit, Pittier 3309, collected on cliffs along the Caldera River, between El Boquete and Caldera, Chiriquí. The mature fruit is cylindric and about 45 mm. long.

Cosmibuena paludicola Standley, sp. nov.

Small tree, 4 to 5 meters high, glabrous throughout; young branches thick and somewhat fleshy; stipules oblong-obovate, about 12 mm. long, rounded at the apex, deciduous, thick and leathery; petioles short, stout, 8 to 12 mm. long; leaf blades narrowly obovate to oblong-oblongate, 8 to 10 cm. long, 3.5 to 5 cm. wide, rounded at the apex, cuneate at the base, thick and leathery, with about 5 veins on each side, these distant, not conspicuous, anastomosing near the margin; inflorescence terminal, of about 5 flowers; ovary 12 to 14 mm. long, cylindric, contracted into a stout stipe of about the same length; calyx cylindric, circumscissile, 9 mm. long, cleft one-third to one-half the distance to the base, the teeth oblong-ovate, obtuse; corolla white, the tube 6 to 6.5 cm. long, 5 to 6 mm. in diameter, gradually dilated upward; corolla lobes narrowly oblong, 25 mm. long, 9 to 11 mm. wide, rounded at the apex; anthers subsessile, attached near the base, 17 mm. long, obtuse at the apex, with 2 slender appendages at the base; style 65 mm. long, hirsute above; stigma bilamellate, the lamellae oblong, 10 mm. long; ovules with long hyaline appendages.

Type in the U. S. National Herbarium, no. 679204, collected in mangrove swamps, vicinity of Viento Frio, Province of Colón, Panama, August 7 and 8, 1911, by H. Pittier (no. 4107).

Distinguished from all related species, including those of South America, by the combination of obtuse leaves and obtuse corolla lobes. The leaves are unlike those of any other species. The pubescence of the style, too, seems to be characteristic. The plant grows at a lower altitude than most of the species.

¹ Biol. Centr. Amer. Bot. 2: 43. 1881.

Deppea longipes Standley, sp. nov.

Young stems reddish brown, succulent, cinereous-puberulent; stipules very small and inconspicuous, about 1 mm. long; petioles 10 to 20 mm. long; leaf blades oval, broadly oval, or elliptic-oval, 8 to 11 cm. long, 3.5 to 5.5 cm. wide, abruptly acuminate, the tips about 10 mm. long, obtuse, acute, or abruptly acute at the base, bright green, prominently veined, glabrous on the upper surface, sparingly tomentulose beneath along the veins; peduncles 22 to 35 mm. long; cymes many-flowered, 5 to 9 cm. broad, the branches tomentulose; bracts minute; pedicels 2.5 to 6 mm. long, often longer than the fruit; calyx lobes triangular, about 0.6 mm. long; corolla bright yellow, glabrous, the tube about twice as long as the calyx lobes, the lobes of the limb 5 mm. long, oblong, obtuse; anthers exserted, the filaments glabrous, slightly longer than the anthers; capsules 5 mm. long, turbinate, conspicuously costate, glabrate.

Type in the U. S. National Herbarium, no. 677458, collected around Camp Aguacatal, eastern slope of Chiriquí Volcano, Panama, altitude 2,100 to 2,200 meters, March 10 to 13, 1911, by H. Pittier (no. 3070).

In general appearance this resembles *D. floribunda* Hemsl., but it is distinguished from that and the other Mexican and Central American species by the large capsules and long pedicels.

Faramea luteovirens Standley, sp. nov.

A small tree or large shrub, often branched from the base, with straight trunk, smooth bark, and radiate branches, glabrous throughout; young stems stout, yellowish green; stipules much wider than long, with a subulate tip, soon deciduous; petioles stout, 6 to 10 mm. long; leaf blades oblong-oval, 9 to 14 cm. long, 4 to 6 cm. wide, obtuse at the base, abruptly caudate at the apex, with an obtuse or acute, narrowly triangular tip 10 to 14 mm. long, yellowish green, coriaceous, the midvein very prominent, the lateral veins conspicuous, 8 to 13 on each side, diverging at nearly right angles, anastomosing near the margin, but not forming a regular or conspicuous marginal vein; inflorescence a sessile panicle, sparsely branched, the central axis 6 cm. long, the lateral ones 1 cm. long or less, the pedicels rather stout, thicker above, 3 cm. long; fruit subglobose, 8 to 9 mm. in diameter, smooth, thick-walled, bearing at the summit the truncate calyx limb (or base of the limb?); no mature seeds seen, the immature ones solitary, with a very deep basal depression.

Type in the U. S. National Herbarium, no. 679194, collected on Loma de la Gloria, near Fató, Province of Colón, Panama, in forests, altitude 10 to 100 meters, August, 1911, by H. Pittier (no. 4098).

Readily distinguished from the other Panamanian species by the yellowish green, coriaceous leaves and long pedicels.

Faramea ovalis Standley, sp. nov.

A small slender tree, 6 to 8 meters high, with a straight trunk and pyramidal crown, glabrous throughout; young branches very slender, green; stipules broadly rounded, 1.5 mm. long or less, each bearing a subulate tip 3 to 9 mm. long; petioles slender, 4 to 10 mm. long; leaf blades oval or rarely obovate-oval or oval-oblong, 4 to 8 cm. long, 2 to 5 cm. wide, rounded to acute at the base, abruptly caudate at the apex, the tip 6 to 10 mm. long and 2 to 3 mm. wide, obtuse or rounded, the blades bright green, thin, with 7 to 11 lateral veins on each side, these not conspicuous, diverging at nearly right angles; peduncles 12 to 17 mm. long; flowers in simple umbels, usually 4 on each peduncle, on pedicels 12 to 14 mm. long; calyx and ovary together 3 mm. long, narrowly campanulate, green, glabrous, the limb very shallowly and obscurely dentate; corolla purplish white, 14 to 17 mm. long, glabrous outside, the tube 10 to 11 mm. long, 2.5 mm. in diameter, the throat but slightly inflated, the lobes ovate-oblong, acute or acutish, puberulent within; style slightly exserted; fruit not known.

Type in the U. S. National Herbarium, no. 675764, collected in forests along the Río Ladrillo, above El Boquete, Chiriquí, Panama, altitude 1,200 to 1,300 meters, March

17 to 19, 1911, by William R. Maxon (no. 5397). Also collected between the Río Ladrillo and Los Sigüas Camp, southern slope of Cerro de la Horqueta, Chiriquí, Panama, altitude 1,200 to 1,700 meters, March 17 to 19, 1911, by H. Pittier (no. 3159).

Related to *Faramea occidentalis* (L.) A. Rich., which is represented by several Panama collections, but differing in its smaller leaves, umbellate rather than corymbose inflorescence, and shorter corolla.

Faramea scalaris Standley, sp. nov. *

A glabrous shrub; young branches slender, green; stipules 5 to 7 mm. long, united and sheathing, the free border rounded, obtuse, or acutish, with a mucronate tip 1.5 mm. long or less; petioles very stout, 2 to 5 mm. long; leaf blades narrowly elliptic-oblong to narrowly oblanceolate, 10 to 16 cm. long, 1.5 to 3 cm. wide, acuminate, often rather abruptly so, to a rounded tip, acute at the base, bright green, rather thin, the midvein very prominent, the lateral nerves 8 to 14 on each side, divergent nearly at right angles, anastomosing near the margin in a very conspicuous marginal vein; flowers in a compound umbellate inflorescence about 4 cm. long, the peduncle about 15 mm. long; bracts minute, pedicels 3 to 4 mm. long, strongly tinged with blue; calyx and ovary together 2 mm. long, campanulate, glabrous, blue, the limb dentate, the teeth triangular, acutish, corolla purplish white, glabrous, 11 to 12 mm. long, the tube slender, slightly broadened in the throat, the lobes ovate-oblong, 4 mm. long, obtuse; fruit not known.

Type in the U. S. National Herbarium, no. 677656, collected in the humid forest between Alto de las Palmas and top of Cerro de la Horqueta, Chiriquí, Panama, altitude 2,100 to 2,268 meters, March 18, 1911, by H. Pittier (no. 3265).

The affinities of the present species are apparently with the Brazilian *Faramea salicifolia* Presl, but in that plant the stipules are long-aristate and the venation of the leaves is very different.

Guettarda foliacea Standley, sp. nov.

A small tree or large shrub, branching from the base, with spiny arcuate branches; older branches slender, terete, dark brown, the youngest ones obtusely quadrangular, densely strigose-hispidulous; stipules 5 mm. long, oblong-triangular, early deciduous; petioles slender, 10 to 22 mm. long, strigose-hispidulous; leaf blades elliptic or elliptic-oval, 10 to 16 cm. long, 3.5 to 5.5 cm. wide, rather abruptly acute, acute to obtuse at the base, thinly membranous, bright green, very sparsely hispid on the upper surface with rather short hairs, strigillose beneath, prominently veined, the veins slender, about 8 on each side; peduncles slender, 10 to 15 mm. long, strigose-hispidulous, bearing few densely cymose sessile or short-pedicellate flowers; bracts 4 to 5 mm. long, narrowly oblong or linear-oblong, obtuse, green and foliaceous, persistent, glabrous on the inner surface, sparsely pubescent on the outer, long-ciliate; calyx broadly cylindric, 2 mm. long, densely pubescent with short appressed hairs, the margin truncate and entire or nearly so; corolla tube 15 to 17 mm. long, slender, densely sericeous, the lobes oblong or oblong-oval, obtuse, 4 mm. long; style about 2 cm. long, slender, bearing a few long slender appressed hairs, the stigma very small; fruit not seen.

Type in the U. S. National Herbarium, no. 679116, collected along the Trinidad River, Canal Zone, Panama, near sea level, July 19 to 21, 1911, by H. Pittier (no. 4031).

Readily distinguished by the large, foliaceous, long-ciliate bracts. The leaves, too, are very large and thin, being similar in texture to those of *G. ramuliflora*.

Hamelia pauciflora Standley, sp. nov.

Shrub with slender branches, the older ones grayish, terete, the younger ones obtusely angled, sparsely short-villous; stipules very small; petioles rather stout, 2.5 mm. long or less; leaves mostly in 3's, the blades broadly ovate to ovate or oval-ovate, 15 to 28 mm. long, 7 to 15 mm. wide, acute or acutish, acute or obtuse at the base,

very thin, bright green, glabrous on the upper surface, sparsely short-villous beneath, ciliolate, very faintly veined, the lateral veins 3 or 4 pairs; peduncles terminating short lateral branches, 2 to 4-flowered, sometimes dichotomous or often reduced to a single secund branch, the flowers in the axils of the branches sessile or subsessile, the others on slender pedicels 10 mm. long or less, the peduncles slender, 7 to 15 mm. long, sparsely villous; calyx 3 to 3.5 mm. long, glabrous or nearly so, the lobes broadly triangular, less than half as long as the tube; corolla about 22 mm. long, slightly broadened upward, very sparsely villous outside, especially about the lobes, these oval-ovate, obtuse, 1.5 mm. long; anthers equaling or usually slightly exceeding the corolla lobes; fruit not seen.

Type in the U. S. National Herbarium, no. 678513, collected in forests on dry limestone, around Alhajuela, Chagres Valley, Province of Panama, Panama, at an altitude of 30 to 100 meters, May 12 to 15, 1911, by H. Pittier (no. 3469).

Distinct from all other species by the much reduced inflorescence and small leaves. It is related, possibly, to *H. chrysantha* Swartz, but has fewer, differently arranged flowers, shorter petioles, and more pubescent, thinner, verticillate leaves.

Hoffmannia pittieri Standley, sp. nov.

Stems herbaceous, terete, glabrous; stipules triangular, acutish, 3 mm. long; petioles slender, glabrous, 2 to 3 cm. long; leaf blades oblong-obovate to oval-oblong, 12 to 24 cm. long, 6 to 9 cm. wide, abruptly acuminate, the tips obtuse, attenuate to the base, glabrous, dull green above, paler beneath, prominently veined; cymes on peduncles 2 to 3 mm. long, the secondary branches 10 to 18 mm. long, angled, puberulent, the whole inflorescence loose and open; bracts oblong-linear, acute, deciduous; pedicels (in fruit) about 4 mm. long; open flowers not seen, the corolla said to be yellow; calyx and ovary together (in bud) about 3 mm. long, sparingly puberulent, the calyx lobes ovate, obtuse or acutish; fruit cylindric-campanulate, 5 mm. long, glabrous, costate; seeds numerous, brown, favose.

Type in the U. S. National Herbarium, no. 677642, collected in the humid forest between Alto de las Palmas and top of Cerro de la Horqueta, Chiriquí, Panama, altitude 2,100 to 2,250 meters, March 18, 1911, by H. Pittier (no. 3247).

Distinguished from the other Costa Rican and Panamanian species by its open inflorescence and large, broad leaves.

Palicourea chiriquina Standley, sp. nov.

A shrub 2 to 3 meters high, glabrous throughout; branches rather stout, yellowish green, obtusely quadrangular; stipules united to form a sheath 2 to 3 mm. long, each stipule bilobate, the lobes linear, acute, slightly shorter than the sheath; petioles stout, 6 to 15 mm. long; leaf blades elliptic-oval or elliptic-oblong, 5 to 10.5 cm. long, 2 to 5 cm. wide, acute or acuminate, often abruptly so, obtuse to broadly cuneate at the base, subcoriaceous, yellowish green, somewhat lustrous on the upper surface, the veins conspicuous on both surfaces, diverging nearly at right angles, the lateral ones about 15 on each side, parallel; inflorescence thyrsoid-paniculate, on peduncles 2 to 4 cm. long, the panicles 4 to 5 cm. long and 2.5 to 4.5 cm. wide, loosely branched, the branches spreading, green; bracts oblong or narrowly ovate, 1.5 to 3 mm. long; pedicels slender, 2 to 4 mm. long; calyx scarcely 1 mm. long, about equaling the ovary, the lobes of the limb rounded-ovate, obtuse; corolla 6 mm. long, stout, sulphur-yellow, glabrous outside, long-bearded within at about the middle, the lobes of the limb very short, rounded-ovate; fruit not seen.

Type in the U. S. National Herbarium, no. 677607, collected in the humid forest of Cuesta de las Palmas, southern slope of Cerro de la Horqueta, Chiriquí, Panama, at an altitude of 1,700 to 2,100 meters, March 17 to 19, 1911, by H. Pittier (no. 3211). Additional material is mounted on sheet 677606.

Related to *Palicourea mexicana*, but sufficiently distinguished by the short yellow corolla, spreading green branches of the inflorescence, and smaller leaves.

Along with the type specimens Mr. Pittier collected a short branch of another and probably undescribed species. This has a densely pubescent inflorescence, oval leaves, and very small corollas. The material is too fragmentary for diagnosis.

***Palicourea heterantha* Standley, sp. nov.**

Young branches stout, obtusely quadrangular, the lower internodes glabrous, the uppermost densely villous with multicellular hairs, or sometimes villous only along the angles; stipules united into a loose sheath 5 to 7 mm. long, each stipule bilobate, the lobes oblong-linear, acute, as long as the sheath or sometimes longer, glabrous, sometimes ciliate; petioles stout, 1 to 2 cm. long, villous; leaf blades obovate to broadly oval-obovate, 8 to 13 cm. long, 4.5 to 7 cm. wide, rounded at the apex and coarsely apiculate, the tip triangular, 3 mm. long, acutish or broadly cuneate at the base, subcoriaceous, dull green, slightly lustrous above and glabrous beneath, short-villous, especially along the veins; peduncles stout, 3 to 3.5 cm. long; inflorescence thyrsoïd-paniculate, 5 to 6 cm. long and of about the same breadth, copiously branched, the branches stout, ascending or spreading, densely short-villous; bracts lanceolate or lance-ovate, 3 to 8 mm. long; pedicels stout, 1 to 4 mm. long; calyx 2 mm. long, slightly longer than the ovary, deeply lobed, the lobes broadly ovate-oblong, obtuse, glabrous, bluish when dried; corolla 10 to 12 mm. long and 5 to 6 mm. in diameter, very gibbous at the base, the lobes very broad, rounded, thick and leathery, glabrous outside, sparsely villous within below the middle; stamens inserted at the middle of the corolla tube, the filaments short, the anthers included; fruit not seen.

Type in the U. S. National Herbarium, no. 531296, collected on the headwaters of the Río López, Río Palo Basin, Tierra Adentro, State of Cauca, Colombia, at an altitude of 2,500 to 3,000 meters, January, 1906, by H. Pittier (no. 1098).

Although the fruit has not been seen, there is little doubt that this plant is a member of the genus *Palicourea*. From the Colombian species previously described it is well distinguished by the very broad corolla, the loose sheaths of the stipules, and the villous pubescence. It is impossible to state the color of the fresh flowers, but when dried they are bluish.

***Rondeletia secunda* Standley, sp. nov.**

Shrub; young branches slender, glabrous, brown; stipules 4 to 5 mm. long, persistent, triangular, with a subulate apex; petioles stout, 3 to 7 mm. long, glabrous; leaf blades elliptic to elliptic-oval, 10.5 to 16 cm. long, 3.5 to 6.5 cm. wide, abruptly acuminate or subattenuate, obtuse or acutish at the base, firm, green, glabrous on both surfaces or sometimes with a very few short hairs along the veins beneath, the veins prominent, the lateral ones about 8 pairs; flowers numerous, secund and subsessile along the slender, spreading or scorpioid branches of the loose panicle, this 6 to 7 cm. long and of about the same breadth, on a peduncle about 6 cm. long, the flowers rather distant upon the branches; branches of the inflorescence sparsely villous, the bracts small, green, linear; calyx tube 1.5 mm. long, villous but not densely so, the 4 lobes linear or oblong-linear, green, sparsely pubescent, longer than the tube, sometimes twice as long, unequal, one of the lobes usually broader and longer than the others; corolla white, the tube slender, 10 to 12 mm. long, rather sparsely villosulous outside, the 4 lobes rounded, 3 to 4 mm. long, the throat naked; stamens inserted below the middle of the tube; stigma shortly 2-lobed; capsules 4 mm. high, bearing the persistent calyx lobes; seeds very small, light brown, favose.

Type in the U. S. National Herbarium, no. 679392, collected in forests around Puerto Obaldía, San Blas Coast, Panama, at an altitude of 50 meters or less, August, 1911, by H. Pittier (no. 4279).

Distinguished from the other species of Central America and northern South America by the secund arrangement of the flowers in the open panicles and by the glabrous leaves and long calyx lobes.

***Rustia ferruginea* Standley, sp. nov.**

A small tree; young branches stout, obtusely quadrangular, villous-puberulent with soft reddish hairs; stipules not seen, deciduous; petioles stout, very short, 1 to 3 cm. long; leaf blades obovate or oval-obovate, 15 to 30 cm. long, 7 to 12 cm. wide, rather abruptly acute or acuminate, acuminate or attenuate at the base, firm, rather inconspicuously veined, the lateral veins numerous, parallel, meeting at their apices in a marginal vein, glabrous on the upper surface, densely puberulent beneath with ferruginous hairs; inflorescence a densely flowered, short-pedunculate, terminal panicle 8 to 10 cm. long and of about the same width, the branches abundantly puberulent; bracts deciduous; calyx broadly campanulate, 1.5 mm. high, puberulent outside, the margin shallowly 5-lobed; corolla white, the tube 2 to 4 mm. long, slightly dilated above, glabrous outside, the lobes valvate, thick, about as long as the tube, lance-triangular, acute or acutish, puberulent, reflexed in anthesis, the throat of the corolla densely bearded within with coarse white hairs; stamens mostly concealed by the hairs of the corolla, the filaments subulate, the anthers erect, attached by the base; style exserted, shortly 2-lobed at the apex; ovary 2-celled; mature fruit not seen.

Type in the U. S. National Herbarium, no. 679302, collected along the Río Fató, Province of Colón, Panama, in forests or thickets, altitude 10 to 100 meters, August, 1911, by H. Pittier (no. 4201).

From all other species of the genus this differs in its ferruginous pubescence.

***Stachyarrhena heterochroa* Standley, sp. nov.**

A small tree, 8 to 10 meters high, with a straight trunk, radiate branches, and a pyramidal crown; bark grayish, smooth; young branches stout, terete, lustrous, glabrous; stipules 2 to 3 mm. high, united and forming a truncate sheath; petioles stout, 2 to 3 cm. long; leaf blades oval to oblong-elliptic or rarely oblong-obovate, 15 to 28 cm. long, 5 to 9 cm. wide, abruptly acuminate or sometimes caudate, the tip about 15 mm. long, acute at the base, coriaceous, glabrous, shining on the upper surface, the veins prominent, especially the midrib, the lateral veins 9 to 12 on each side; spikes pendulous, mostly terminal, 18 to 28 cm. long, glabrous, naked at the base for 4 to 7 cm., the flowers sessile, solitary and remote, or sometimes verticillate; calyx broadly campanulate, 2 mm. high, the margin very obscurely repand-denticulate; corolla 8 mm. long, turbinate, purplish pink inside, pale pink or lavender outside, the 5 lobes broadly oblong or rounded-oblong, slightly spreading, densely villous within; stamens inserted on the middle of the tube, the filaments very short; stigmas broad, acute.

Type in the U. S. National Herbarium, no. 679174, collected in forests on Loma de la Gloria, near Fató, Province of Colón, Panama, altitude 10 to 100 meters, August, 1911, by H. Pittier (no. 4078).

The fruit, which was not collected, is said to be the color of a cherry.

Only three other species of this genus have been described, all from Brazil. The Panama plant resembles *Stachyarrhena penduliflora* Schum.¹ in its pendulous inflorescence. That species, however, has yellow flowers, obtuse leaves, and a tubular corolla.

¹ In Mart. Fl. Bras. 6^o: 370. 1889.

INDEX.

[Synonyms in *italic*. Page numbers of principal entries in heavy-face type.]

	Page.		Page.
<i>Achyranthes</i>	89	<i>Canavalia acuminata</i>	107
<i>calea</i>	94	<i>bicarinata</i>	106
<i>cordobensis</i>	90	<i>Carex hermaphrodita</i>	88
<i>laguroides</i>	90	<i>Cassia</i>	102
<i>mexicana</i>	89	<i>bacillaris</i>	103
<i>panamensis</i>	89	<i>caudata</i>	102
<i>piloselloides</i>	93	<i>falcinella</i>	102
<i>pycnantha</i>	90	<i>grandis</i>	103
<i>stenophylla</i>	90	<i>inaequilatera</i>	103
<i>williamsii</i>	89, 90, 91	<i>regia</i>	103
<i>Allionia</i>	98	<i>stenocarpa</i>	104
<i>arenaria</i>	101	<i>tagera</i>	104
<i>campanulata</i>	101	<i>undulata</i>	102
<i>Allioniaceae</i>	87, 98	<i>Cassupa</i>	87
<i>Alternanthera</i>	89	<i>alba</i>	135
<i>latifolia</i>	94	<i>panamensis</i>	133, 135
<i>Amaranthaceae</i>	87, 88	<i>Cephaelis axillaris</i>	123
<i>Arcytophyllum</i>	126	<i>costaricensis</i>	123
<i>capitatum</i>	126, 127	<i>elata</i>	123
<i>caracasenum</i>	126	<i>muscosa</i>	123
<i>caucanum</i>	127	<i>psychotriaefolia</i>	133
<i>cephalanthum</i>	127, 128	<i>punicea</i>	123
<i>hartwegianum</i>	128	<i>tomentosa</i>	123
<i>latifolium</i>	127	<i>Chalarium</i> (section).....	108, 109
<i>lavarum</i>	127	<i>Chamaecrista</i>	102
<i>shannoni</i>	127	<i>patellaria</i>	104
<i>Basanacantha lasiantha</i>	134	<i>simplex</i>	103
<i>monantha</i>	134	<i>stenocarpa</i>	104
<i>pittieri</i>	134	<i>tagera</i>	104
<i>subcordata</i>	134	<i>Chomelia boliviana</i>	135, 136
<i>Becquerelia glomerulata</i>	88	<i>brachyloba</i>	136, 137
<i>Boerhaavia</i>	98	<i>filipes</i>	137
<i>grandiflora</i>	101	<i>pohlana</i>	136
<i>plumbaginea</i>	101	<i>tenuiflora</i>	135, 136, 137
<i>repanda</i>	101	<i>Cierrate de escobilla</i>	105
<i>squarrosa</i>	101	<i>Clematis virginiana</i>	117
<i>tuberosa</i>	101	<i>Commicarpus</i>	98
<i>verticillata</i>	101	<i>grandiflorus</i>	101
<i>Borreria</i>	122	<i>plumbagineus</i>	101
<i>laevis</i>	122	<i>repandus</i>	101
<i>latifolia</i>	122	<i>squarrosus</i>	101
<i>spinosa</i>	122	<i>tuberosus</i>	101
<i>tenella</i>	122	<i>verticillatus</i>	101
<i>Bradburya angustifolia</i>	106	<i>Cosmibuena macrocarpa</i>	137
<i>heteroneura</i>	106	<i>ovalis</i>	137
<i>Buena panamensis</i>	126	<i>paludicola</i>	137
<i>Bulbostylis paradoxa</i>	88	<i>Cyperaceae</i>	87
<i>Calicocca ipecacuanhae</i>	123	<i>Cyperus</i>	87
<i>Calliandra</i>	104	<i>hermaphroditus</i>	88
<i>pittieri</i>	104	<i>Deppea floribunda</i>	138
<i>purdiaei</i>	104	<i>longipes</i>	138
<i>Calyptracarya</i>	87	<i>Diodioides</i>	122
<i>fragifera</i>	88	<i>Diospyros</i>	118
<i>glomerulata</i>	88	<i>blepharophylla</i>	119
<i>Campyloneurum</i>	124	<i>ciliata</i>	119, 119

	Page.		Page.
<i>Diospyros ebenaster</i>	120	<i>Gonzalagunia</i>	124
<i>ebeneum</i>	120	<i>brachyantha</i>	125
<i>guianensis</i>	120	<i>bracteosa</i>	125
<i>palmeri</i>	119	<i>leptantha</i>	125
<i>paralea</i>	120	<i>mollis</i>	125
<i>rosei</i>	119, 120, 121	<i>nivea</i>	125
<i>sonorae</i>	120	<i>ovatifolia</i>	126
<i>sphaerantha</i>	121	<i>petesia</i>	126
<i>virginiana</i>	118, 119	<i>pulverulenta</i>	126
<i>Dolicholus angulatus</i>	107	<i>rugosa</i>	126
<i>calycosus</i>	108	<i>sagraeana</i>	126
<i>ixodes</i>	107	<i>thyrsoides</i>	126
<i>phaseoloides</i>	108	<i>tomentosa</i>	126
<i>reticulatus</i>	107	<i>Gonzalea</i>	124
<i>Dormidera de escobilla</i>	105	<i>asperula</i>	125
<i>Drepanospron</i> (group)	109	<i>brachyantha</i>	125
<i>Duggena</i>	125	<i>bracteosa</i>	125
<i>asperula</i>	125	<i>grisea</i>	125
<i>brachyantha</i>	125	<i>hayesii</i>	125
<i>bracteosa</i>	125	<i>leptantha</i>	125
<i>grisea</i>	125	<i>mollis</i>	125
<i>hayesii</i>	125	<i>nivea</i>	125
<i>leptantha</i>	125	<i>ovatifolia</i>	126
<i>mollis</i>	125	<i>panamensis</i>	126
<i>nivea</i>	125	<i>petesia</i>	126
<i>ovatifolia</i>	126	<i>pulverulenta</i>	126
<i>panamensis</i>	125, 126	<i>spicata</i>	126
<i>petesia</i>	126	<i>thyrsoides</i>	126
<i>pulverulenta</i>	126	<i>tomentosa</i>	126
<i>rudis</i>	125	<i>Gossypianthus</i>	93
<i>rugosa</i>	126	<i>brittonii</i>	92
<i>sagraeana</i>	126	<i>lanuginosus</i>	93
<i>spicata</i>	126	<i>Guayaparin</i>	120
<i>thyrsoides</i>	126	<i>Guettarda foliacea</i>	139
<i>tomentosa</i>	126	<i>ramuliflora</i>	139
<i>Erythrina darienensis</i>	108	<i>Hamelia chrysantha</i>	140
<i>Evea</i>	123	<i>pauciflora</i>	139
<i>axillaris</i>	123	<i>Hedyotis capitata</i>	126
<i>campyloneuroides</i>	123	<i>caracasana</i>	126
<i>dichroa</i>	124	<i>cephalantha</i>	127
<i>elata</i>	123	<i>hartwegiana</i>	126
<i>ipecacuanha</i>	123	<i>Hibiscus</i>	111, 112
<i>muscosa</i>	123	<i>Hoffmannia pittieri</i>	140
<i>tomentosa</i>	123	<i>Ipecacuanha officinalis</i>	123
<i>Faramea luteovirens</i>	138	<i>Iresine</i>	89, 94
<i>occidentalis</i>	139	<i>acicularis</i>	93
<i>ovalis</i>	138	<i>angustifolia</i>	96
<i>salicifolia</i>	139	<i>arbuscula</i>	97
<i>scalaris</i>	139	<i>arenaria</i>	93
<i>Geranium</i>	110	<i>argentata</i>	94, 98
<i>confertum</i>	111	<i>calea</i>	94
<i>diffusum</i>	110	<i>celosioides</i>	93, 95
<i>lindenianum</i>	110	<i>obtusifolia</i>	95
<i>sessiliflorum</i>	111	<i>costaricensis</i>	94, 98
<i>stoloniferum</i>	110	<i>elatior</i>	96
<i>subnudicaule</i>	110	<i>latifolia</i>	94, 94
<i>velutinum</i>	111	<i>laxa</i>	94
<i>Gomphrena decumbens</i>	91, 91, 92	<i>nitens</i>	95
<i>genuina</i>	91	<i>pacifica</i>	96
<i>grandifolia</i>	91	<i>paniculata obtusifolia</i>	95
<i>pringlei</i>	92	<i>rotundifolia</i>	96
<i>dispersa</i>	91, 92	<i>schaffneri</i>	96, 97
<i>latifolia</i>	94	<i>stricta</i>	97
<i>parviceps</i>	92	<i>tomentella</i>	97
<i>pringlei</i>	92	<i>wrightii</i>	97

	Page.		Page.
Leguminosae.....	87	Peltaea (section).....	113
Lopimia.....	114	sessiliflora.....	113
dasypetala.....	114	speciosa.....	113
malacophylla.....	114, 115	Persimmon, common.....	118
Maba.....	118	Phaseolus chiriquinus.....	109
acapulcensis.....	118, 119	multiflorus.....	109
albans.....	118, 119	Pisonia.....	98
intricata.....	118, 119	areolata.....	100
latifolia.....	118	boliviana.....	100
pavonii.....	118	cafferiana.....	100
salicifolia.....	118	campestris.....	100
verae-crucis.....	119	combretiflora.....	100
Macrelghtia (section).....	118	coriifolia.....	100
Malache.....	113, 114, 115	cuspidata.....	100
arachnoidea.....	117	eggersiana.....	100
fulva.....	115	ferruginea.....	100
leucantha.....	117	fragrans.....	100
maxonii.....	116	graciliflora.....	100
panamensis.....	116, 117	harrisiana.....	100
penduliflora.....	117	hassleriana.....	100
peruviana.....	116	hirsuta.....	100
rosea.....	115	inermis.....	100
typhalaea.....	115	laxiflora.....	100
warmingiana.....	116	ligustrifolia.....	100
Malachra.....	113	linearibracteata.....	100
trinervis.....	113	luteovirens.....	100
Mallostoma lavarum.....	127	microphylla.....	100
shannoni.....	128	nitida.....	101
Malvaceae.....	87, 111, 113, 114	noxia.....	101
subfamily Hibisceae.....	112	obtusata.....	99
Mariscus jaquinii.....	88	domingensis.....	100
Meibomia maxonii.....	108	olfersiana.....	101
Mimosa.....	104	pacutero.....	101
albida.....	105	paraguayensis.....	101
debilis.....	105	pernambucensis.....	101
panamensis.....	104	salicifolia.....	101
panamensis.....	104	schomburgkiana.....	101
williamsii.....	105	suspensa.....	101
Mirabilis.....	98	tomentosa.....	101
arenaria.....	101	uleana.....	101
campanulata.....	101	venosa.....	101
Morinda muscosa.....	123	Psychotria.....	128
Morongia.....	104	aggregata.....	128
distachya.....	106	albonervia.....	131
pilosa.....	105	arcuata.....	131
Neea.....	98	calophylla.....	129
delicatula.....	98	carthaginensis.....	132
psychotrioides.....	99	chiriquina.....	129
Palicourea.....	141	crassa.....	132
chiriquina.....	140	fendleri.....	129
heterantha.....	141	goldmanii.....	130
mexicana.....	140	granadensis.....	130
Panama flora, relations.....	87	insignis.....	130
Paritium.....	112	inundata.....	131
Pavonia.....	113, 114	lelocarpa.....	130
bracteosa.....	113	magna.....	131
dasypetala.....	114	panamensis.....	132
geminiflora.....	117	peperomia.....	132
riedelii.....	113	pittleri.....	132
sessiliflora.....	113	psychotriaefolia.....	133
speciosa.....	113	Rhachicallis capitata.....	126
velutina.....	114	caracasana.....	126
Peltaea.....	113	Rondeletia secunda.....	141
ovata.....	113	Rubiaceae.....	87, 124
riedelii.....	113	Rustia ferruginea.....	142

	Page.		Page.
<i>Rynchosia calycosa</i>	108	<i>Torrubia costaricana</i>	99
<i>Rynchospora</i>	87	<i>cuspidata</i>	100
<i>argentea</i>	87	<i>domingensis</i>	100
<i>Saponemas</i>	108	<i>dussii</i>	99
<i>Schoenus paradoxus</i>	88	<i>eggersiana</i>	100
<i>Scleria</i>	87	<i>ferruginea</i>	100
<i>hitchcockii</i>	88	<i>fragrans</i>	99, 100
<i>Spermacoce hispida</i>	122	<i>graciliflora</i>	100
<i>laevis</i>	122	<i>harrisiana</i>	100
<i>latifolia</i>	122	<i>hassleriana</i>	100
<i>spinosa</i>	122	<i>hirsuta</i>	100
<i>tenella</i>	122	<i>laxiflora</i>	100
<i>Stachyarrhena</i>	87	<i>ligustrifolia</i>	100
<i>heterochroa</i>	133, 142	<i>linearibracteata</i>	99, 100
<i>penduliflora</i>	142	<i>luteovirens</i>	100
<i>Stenophyllus</i>	87	<i>microphylla</i>	100
<i>paradoxus</i>	88	<i>nitida</i>	101
<i>Styrax</i>	121	<i>noxia</i>	101
<i>argenteus</i>	122	<i>olfersiana</i>	101
<i>bogotensis</i>	122	<i>pacurero</i>	101
<i>panamensis</i>	121	<i>paraguayensis</i>	101
<i>warscewiczii</i>	122	<i>pernambucensis</i>	101
<i>Tapogomea axillaris</i>	123	<i>potosina</i>	99
<i>tomentosa</i>	123	<i>salicifolia</i>	101
<i>Tardavel</i>	122	<i>schombbergkiana</i>	101
<i>laevis</i>	122	<i>suspensa</i>	101
<i>latifolia</i>	122	<i>tomentosa</i>	101
<i>ocymoides</i>	122	<i>uleana</i>	101
<i>spinosa</i>	122	<i>venosa</i>	101
<i>tenella</i>	122	<i>Typhalaea</i> (subgenus).....	115
<i>Torrubia areolata</i>	100	<i>Waltheria glomerata</i>	117
<i>boliviana</i>	100	<i>involucrata</i>	117
<i>cafferiana</i>	100	<i>subcordata</i>	117
<i>campestris</i>	100	<i>Wrecklea</i>	112
<i>combretiflora</i>	100	<i>insignis</i>	112
<i>coriifolia</i>	100		

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FROM THE

UNITED STATES NATIONAL HERBARIUM

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NEW OR NOTEWORTHY PLANTS FROM
COLOMBIA AND CENTRAL
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II

PREFACE.

In the present paper, the fifth of the series, Mr. Henry Pittier, of the Bureau of Plant Industry, United States Department of Agriculture, discusses and describes trees and shrubs of Central America and the northern part of South America, hitherto imperfectly or not at all known. Most of them are components of the wonderfully rich native Isthmian silva and several are of importance as timber trees. A large part of the paper is devoted to a revision of the genera *Brownea* and *Browneopsis* founded on the extensive material collected by the author in Darien and Venezuela. Mr. Pittier's recent observations and collections in Panama permit a better understanding of the genera *Bombax* and *Pachira*, which has led him to segregate two species from *Pachira* to form the new genus *Bombacopsis*.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

CONTENTS.

	Page.
Introduction.....	143
Myristicaceae.....	143
A new species of <i>Virola</i> and an old one of <i>Compsonura</i>	143
Caesalpiniaceae.....	145
The genera <i>Brownea</i> and <i>Browneopsis</i> as represented in Panama, Colombia, and Venezuela.....	145
Need of new treatment.....	145
<i>Brownea</i> versus <i>Hermesias</i>	145
The species of <i>Brownea</i>	146
Geographical distribution of the species.....	147
The genus <i>Browneopsis</i>	148
Affinities of <i>Brownea</i> and <i>Browneopsis</i>	148
Panamanian and Venezuelan species of <i>Brownea</i>	149
A new species of <i>Browneopsis</i>	157
Anacardiaceae.....	157
An old and a new species of <i>Tapirira</i>	157
Hippocrateaceae.....	159
A new species of <i>Salacia</i>	159
Bombacaceae.....	159
<i>Bombacopsis</i> , a new Central American genus between <i>Bombax</i> and <i>Pachira</i>	159
Characters of <i>Bombax</i>	159
Characters of <i>Pachira</i>	160
The differences sufficient for distinction.....	160
An intermediate genus required.....	161
Key to <i>Bombax</i> , <i>Pachira</i> , and <i>Bombacopsis</i>	161
Description of <i>Bombacopsis</i> and its species.....	162
Flacourtiaceae.....	163
A new species of <i>Zuelania</i> and an old one of <i>Oncoba</i>	163
Sapotaceae.....	165
Species, mostly new, of <i>Chrysophyllum</i> , <i>Lucuma</i> , and <i>Bumelia</i>	165
Symplocaceae.....	168
A new species of <i>Symplocos</i>	168
Verbenaceae.....	169
New species of <i>Citharexylum</i> and <i>Vitex</i> and an old one of <i>Vitex</i>	169
Index	ix

ILLUSTRATIONS.

PLATES.

		Facing page.
PLATE 57.	<i>Virola warburgii</i> Pittier.....	143
58.	Fruit of <i>Compsonaura costaricensis</i> Warb.....	144
59.	<i>Brownea ariza</i> Benth.....	151
60.	<i>Brownea ariza</i> Benth.....	151
61.	<i>Brownea ariza</i> Benth.....	151
62.	Seeds of <i>Brownea ariza</i> Benth.....	151
63.	Pod and seeds of <i>Browneopsis excelsa</i> Pittier.....	157
64.	<i>Bombax barrigon</i> (Seem.) Decaisne.....	160
65.	<i>Bombax barrigon</i> (Seem.) Decaisne.....	160
66.	<i>Bombax barrigon</i> (Seem.) Decaisne.....	160
67.	<i>Bombax barrigon</i> (Seem.) Decaisne.....	160
68.	<i>Pachira macrocarpa</i> Walp.....	160
69.	Seeds of <i>Pachira macrocarpa</i> Walp.....	160
70.	<i>Pachira aquatica</i> Aubl.....	160
71.	Fruit of <i>Pachira aquatica</i> Aubl.....	160
72.	Flower of <i>Pachira insignis</i> Sav.....	160
73.	Fruit of <i>Pachira insignis</i> Sav.....	160
74.	<i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
75.	<i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
76.	<i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
77.	<i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
78.	<i>Bombacopsis fendleri</i> (Seem.) Pittier.....	163
79.	<i>Zuelania roussoviae</i> Pittier.....	164
80.	Fruit of <i>Lucuma sclerocarpa</i> Pittier.....	166

TEXT FIGURES.

		Page.
FIGURE 88.	<i>Salacia blepharodes</i> Pittier.....	159
89.	<i>Oncoba laurina</i> Warb.....	164
90.	<i>Chrysophyllum panamense</i> Pittier.....	165
91.	<i>Lucuma sclerocarpa</i> Pittier.....	166
92.	<i>Lucuma standleyana</i> Pittier.....	167
93.	<i>Bumelia obovata</i> A. DC.....	168
94.	<i>Symplocos chiriquensis</i> Pittier.....	168
95.	<i>Symplocos chiriquensis</i> Pittier.....	168
96.	<i>Vitex masoniana</i> Pittier.....	170
97.	<i>Vitex floridula</i> Duchass. & Walp.....	171



VIROLA WARBURGII PITTIER.

NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA—5.

By HENRY PITTIER.

INTRODUCTION.

Another installment¹ is here offered of results obtained by the author within his special field. There are descriptions of new species in several families and group studies in the Caesalpiniaceae and Bombacaceae.

MYRISTICACEAE.

A NEW SPECIES OF VIROLA AND AN OLD ONE OF COMPSONEURA.

Virola warburgii Pittier, sp. nov.

PLATE 57.

Section Amblyanthera. A tree 15 to 30 meters high, the trunk 25 to 60 cm. in diameter at the base. Trunk straight, percurrent; ramification radiate; crown pyramidal. Branchlets at first densely ferruginous-tomentose, glabrate in age, dark brown, almost shiny.

Leaves variable in size, leathery. Petioles 1 to 2 cm. long, 2 to 4 mm. thick, densely ferruginous-tomentose. Leaf blades 9 to 35 cm. long, 3 to 12.5 cm. broad, elliptic, subcuneate, rounded or subemarginate at base, mostly long-acuminate at tip, smooth above (except on costa), ferruginous-tomentulose beneath at first but later sparsely covered with brown stellate hairs; costa and primary veins slightly prominent above, the former often brown-tomentose at first and quite prominent and densely tomentose beneath; veins 10 to 15, arcuate and not directly connected along the margin; transverse veinlets almost parallel, impressed above on the older leaves only, prominent but partly concealed by the tomentum beneath.

Inflorescences axillary, amply paniculate, the rachis quite densely ferruginous-tomentose. Male inflorescence: panicles about 10 cm. long and broad; peduncles 1.5 to 3 cm. long, up to 3 mm. thick; floral fascicles provided at base with several ovate-rounded, caducous bracteoles; pedicels about 1.3 mm. long; perianth about 1.7 mm. long, funnel-shaped, 3-fid, densely ferruginous-tomentose outside; anthers usually 6, 0.5 mm. long, shorter than the thick staminal column. Female inflorescence: panicles also about 10 cm. long, but branches apparently less developed; flowers not known.

Fructiferous racemes bearing about 10 nuts, the rachis subglabrous. Peduncle 2 cm. long and 4 mm. thick; pedicels 6 to 8 mm. long. Fruit obovate or subpyriform, 16

¹ The preceding numbers of this series occur in the Contributions as follows: 12: 171-181. pls. 18-19. figs. 11-19. January 27, 1909. 13: 93-132. pls. 17-20. figs. 2-41. June 11, 1910. 13: 431-466. pls. 78-96. figs. 57-91. January 5, 1912. 18: 69-86. pls. 42-56. figs. 76-87. April 16, 1914.

mm. long and 13 to 14 mm. in diameter, covered outside with a thick, fugacious, ferruginous tomentum; pericarp 1.3 mm. thick. Aril deep pink, divided for about two-thirds of its length. Seeds 12 mm. long, 9 mm. in diameter, obovoid, pointed at the base; testa thin, grayish outside and sulcate.

Type in the U. S. National Herbarium, nos. 678554-5, male flowers, collected in forests along the Chagres River above Alhajuela, Province of Panama, Panama, May 12, 1911, by H. Pittier (no. 3505).

Represented also by nos. 715464-6, imperfect female flowers and ripe fruit, collected in woods around San Felix, eastern Chiriquí, Panama, December 22, 1911, by H. Pittier (no. 5255).

Virola warburgii belongs to the section *Amblyanthera* Warb. and stands between the Brazilian species *V. carinata* and *V. venosa*. The seeds from Chiriquí mentioned by Dr. Warburg in the appendix to the description of *V. panamensis*¹ agree with those of this species. According to that monographer, the chalaza is very deep below the apex and forms an umbilical prominence, a scarcely impressed raphe extends to the hilum, and the ruminant endosperm contains fats and crystalloids but no starch. These details I could not verify. The common name of the tree is "bogamani," and not "bogobane."

EXPLANATION OF PLATE 57.—Leaves and fruit; fruit after dehiscence and aril detached. Material from same tree as type specimen. All natural size.

Compsonura costaricensis Warb. Repert. Nov. Sp. Fedde 1: 71, 1905. PLATE 58.

A middle-sized tree with pyramidal crown. Branchlets glabrous, 2 to 4.5 mm. thick, brownish green.

Leaves petiolate, large, membranous, quite glabrous, light green and lustrous above, paler beneath. Petioles 1 to 1.5 cm. long, broadly canaliculate. Leaf blades oblong, 17 to 28 cm. long, 5 to 11 cm. broad, rounded and abruptly cuneate at the base, rounded and abruptly narrowed into an obtuse acumen at tip; margin slightly undulate. Costa and primary veins prominent below, the latter 9 to 12, arcuate, parallel, hardly confluent along the margin; minor veins transverse, almost parallel, distinctly prominent on both faces.

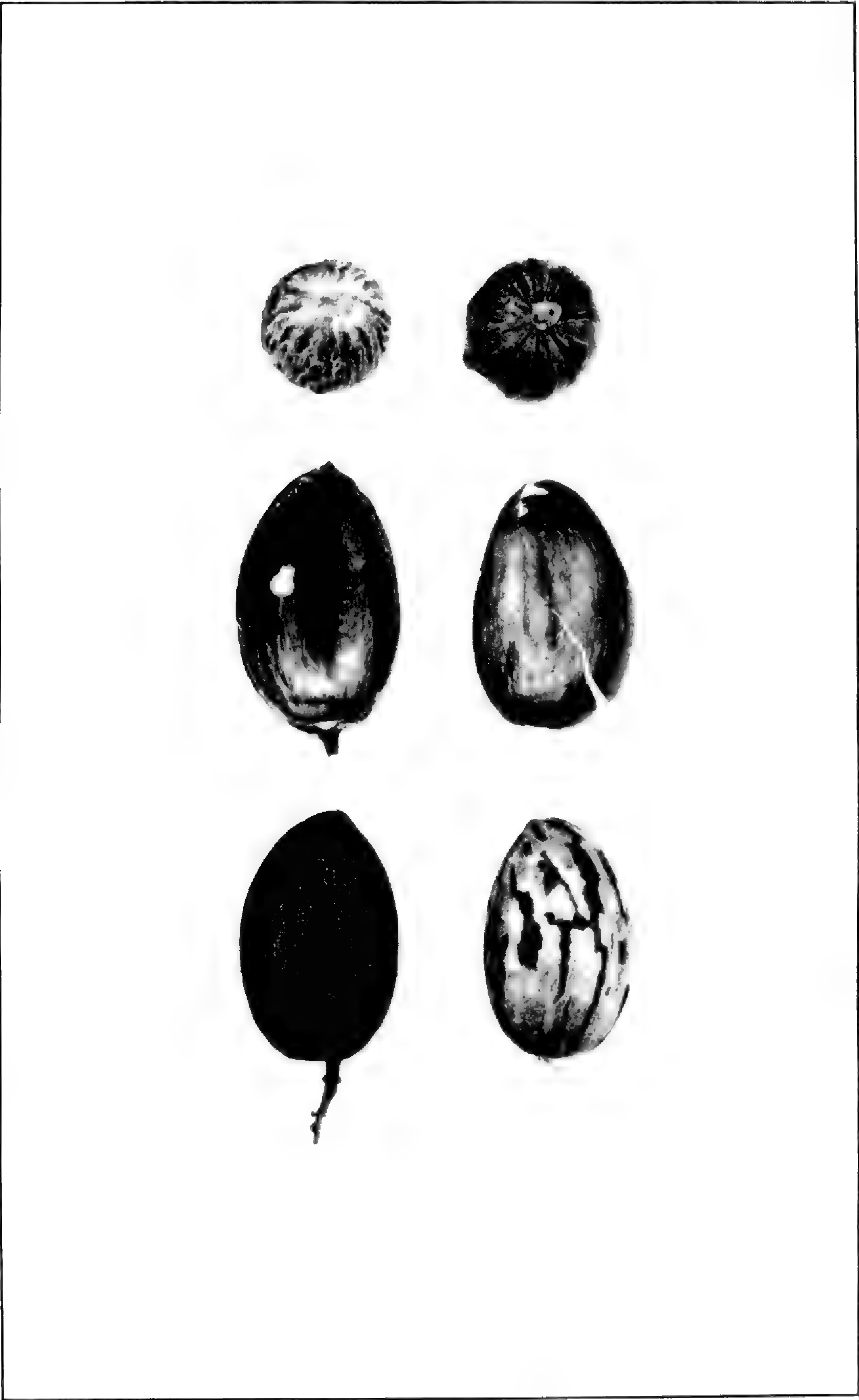
Inflorescences axillary, often geminate, racemose, 1.5 to 3 cm. long, the branchlets 2 to 3 mm. thick; flowers few, clustered at the ends of the racemes (?), their characters not known.

Fruit usually 1, sometimes 2 or 3, in each raceme, ovate, 2.5 to 3.2 cm. long, 2 cm. in diameter, borne on a slender pedicel 7 mm. long, the pericarp yellowish green, smooth. Aril pale yellow, continuous and completely wrapping the seed except at the apex, there open and short-lobate. Perisperm lignose, the surface smooth, pinkish gray with dark brown lines and irregular elongate spots radiating from the basal hilum; endosperm hard, white, hardly ruminant. Embryo small, basal.

COSTA RICA: Plains of San Carlos, *Koschny* (in Herb. Berlin, type); forests of the Río Naranjo, at the southern base of the Dota Mountains, fruit, March, 1893, *Tonduz*, Inst. Fís. Geogr. Costa Rica 7700 (U. S. Nat. Herb.).

The above is an emended translation of Dr. Warburg's original description. Notes taken by me on the occasion when Mr. Tonduz collected his specimens, indicate a middle-sized tree with a habit like that of *Virola*. The leaves are much larger than stated by Dr. Warburg and, judging from the fruit-bearing rachis in our specimens, the racemes are flowered from the base (what I take for remnants of pedicels may, however, be aborted branchlets). The pedicellate nuts attain a length of 3.2 cm. The locality where *Koschny* collected is given as San José, whereas it should read San Carlos; further, the text, after the description of the aril should read "perispermo"

¹ Nov. Act. Acad. Caes. Leop. Carol. 68: 185. 1897.



FRUIT OF COMPONEURA COSTARICENSIS WARB.

instead of "pericarpio." This perisperm, by the way, is remarkable on account of its variegated coloring and is in itself sufficient to distinguish the species.

It is hardly necessary to state here that Dr. Warburg contradicts himself when he asserts that this is the first *Compsonura* species known in Central America, after citing *C. sprucei* as a native of Tabasco. Although it is very doubtful whether the Mexican tree is identical with Spruce's species, there is no question as to its belonging to *Compsonura*.

EXPLANATION OF PLATE 58.—Details of fruit, from the Tonduz specimen cited. Natural size.

CAESALPINIACEAE.

THE GENERA *BROWNEA* AND *BROWNEOPSIS* AS REPRESENTED IN PANAMA, COLOMBIA, AND VENEZUELA.

NEED OF NEW TREATMENT.

The neotropical genus *Brownea* Jacq. is, as a rule, scantily represented in American herbaria. In the U. S. National Herbarium only 3 well authenticated species were represented, the single specimen of one of these being in very poor condition and, of another, collected in the greenhouses of the Department of Agriculture. The remaining few specimens, all wrongly, or at least doubtfully, identified, were received from the Botanical Garden of Buitenzorg (Java).

In the course of my botanical explorations in Central and South America, I have succeeded in obtaining no less than 8 distinct species which, together with one of the 3 species mentioned above, are fully described in the present paper.

The systematic treatment of *Brownea* has been made very difficult on account of the unsatisfactory characterization of Jacquin's types. The only way to identify most of Jacquin's species will be by directly comparing the new material with his types at Vienna. Distinct species have also been repeatedly confused and it is by no means certain that the same forms have not been described under two or more names. That this was the opinion of the lamented Dr. Taubert is indicated by his estimate of only 10 species for the genus, in the *Pflanzenfamilien*, at a time when at least 14 nominal species had already been published.

A general revision of the genus undoubtedly is needed, and it is with the hope that it may be helpful to him who may undertake the task that the present contribution has been prepared.

BROWNEA VERSUS *HERMESIAS*.

Under the name *Hermesias*, Loeffling¹ described a plant collected by himself in his travels through the region between the Orinoco and Unare rivers, about December, 1754. The plant is undoubtedly a *Brownea*, but no specific name is given, and from the description it can not be clearly identified with any of the known species.

¹ *Iter Hisp.* 278. 1758.

Jacquin, on the other hand, published in the Enumeratio (1762) his *Brownea coccinea*, which is completely described in the Stirpium (1788). This is also a Venezuelan plant, and so are the 5 additional species considered in the Fragmenta and Collectanea of the same author. In 1774, J. P. Berg described his *B. rosa-del-monte*, basing it upon specimens collected at Porto Bello, Panama.

It is very difficult, not to say impossible, to identify Loeffling's *Hermesias* with any of the 6 Venezuelan species of Jacquin. The idea of making that name a synonym of *B. rosa-del-monte* is equally inadmissible, since the latter is, so far as we know, restricted to Panama and could not have been collected by the author of *Hermesias*.

There is evidently no type available for this generic name, or, in other words, the name has no standing. Consequently *Brownea* has to be preserved. This is much more convenient, because under the latter name several of the species have been and are still cultivated in greenhouses or tropical gardens, on account of the unusual beauty of the flowers. These species have been crossed and new horticultural varieties put on the market. A change of generic name at this time would then not only be unwarranted for taxonomic reasons but would also cause useless confusion in the practical field of floriculture.

This was clearly understood by the editors of the *Pflanzenfamilien*, when in the *Nachträge*, published in 1896, they reversed the decision of the late Dr. Taubert, who, following O. Kuntze, had adopted *Hermesias* in his treatment of the Leguminosae.¹

THE SPECIES OF BROWNEA.

Up to the present, 15 species of *Brownea* have been described, to which 2 others, which I consider to be new, are here added. The following is the complete list, with the date of publication, and origin of the types.

<i>Brownea coccinea</i> Jacq.....	1762.	Venezuela.
<i>Brownea rosa-del-monte</i> Berg.....	1773.	Panama.
<i>Brownea grandiceps</i> Jacq.....	1789.	Venezuela.
<i>Brownea capitella</i> Jacq.....	1809.	Venezuela.
<i>Brownea latifolia</i> Jacq.....	1809.	Trinidad.
<i>Brownea leucantha</i> Jacq.....	1809.	Venezuela.
<i>Brownea racemosa</i> Jacq.....	1809.	Venezuela.
<i>Brownea speciosa</i> Reichenb.....	1825.	Trinidad.
<i>Brownea cauliflora</i> Poepp. & Endl.....	1845.	Amazonian Peru.
<i>Brownea guianensis</i> Klotzsch.....	1848.	British Guiana.
<i>Brownea ariza</i> Benth.....	1857.	Colombia.
<i>Brownea macrophylla</i> Linden.....	1863.	Colombia.
<i>Brownea negrensis</i> Benth.....	1870.	Northern Brazil.
<i>Brownea birschellii</i> Hook. f.....	1872.	Venezuela.
<i>Brownea neglecta</i> Taub.....	1891.	Origin doubtful.
<i>Brownea aroensis</i> Pittier.....	1916.	Venezuela.
<i>Brownea guaraba</i> Pittier.....	1916.	Venezuela.

¹ In Engl. & Prantl, *Pflanzenfam.* 3³: 145. 1894.

Of these 17 species, one, *B. guianensis* Klotzsch, which has been published in name only, is possibly identical with some of the Venezuelan types or with *B. negrensis*. I have not seen Jacquin's descriptions of the four species in the *Fragmenta*, but the descriptions in the *Prodromus* are certainly too scanty to be of any use. *B. neglecta* is a name only.

GEOGRAPHICAL DISTRIBUTION OF THE SPECIES.

The above list shows that out of 17 species, 10 were described originally from Venezuela. That country, then, has a right to be considered the cradle of the genus, so much the more as it is very probable that further researches in that little explored country will result in the discovery of new types. For instance, it may be stated that among about a dozen specimens remaining from Dr. Vargas's Herbarium, which I saved from utter destruction by bringing to Washington, there is a *Brownea* collected May, 1828, near Tocuyo, in the State of Lara, where it is known under the name of "palo de sangre." The leaves of this plant apparently do not agree with those of any of the described species. They are 2 to 6-jugate, with glandular but otherwise glabrous leaflets, much smaller than is usual in the genus, and long-pediceled flowers. Unfortunately the latter are all in such a fragmentary condition that no attempt could be made to analyze them. On the other hand, as already stated, it is not unlikely that the number of these Venezuelan species will have to be reduced after a careful examination of the types and of new material.

According to Grisebach, *Brownea latifolia* is also found in Trinidad, which has besides a supposed endemic type, *B. speciosa*, found by me, however, in Venezuela in 1913. *Brownea rosa* Griseb. (not *B. rosa-del-monte* Berg) of St. Vincent, may be a distinct type restricted to the Lesser Antilles—unless it is one of the Venezuelan species under cultivation. The *Brownea rosa-del-monte* of Fawcett's *Guide to Castleton Gardens, Jamaica*, is *Brownea ariza* Benth. and it is not unlikely that this is also the plant referred to by Taubert, when he gives Jamaica as the origin of *B. coccinea*.

Only one species has, to my knowledge, been reported from British Guiana and none from the country farther east. As *Brownias* generally grow in the foothills and gorges of low mountains and seldom, if ever, in the proper coastal plain, and as the hinterland of the Guianas has been very little explored botanically, it is easy to understand how these plants can have hitherto escaped observation. The same applies to the hinterland of Brazil, where Martius discovered Bentham's *B. negrensis*. The area of this species seems to mark the southernmost limit of the genus, since *B. cauliflora* has been transferred to the new genus *Browneopsis*.

From Colombia two species, *B. ariza* and *B. macrophylla*, have been reported. The former corresponds to the type of the Multijugatae, already represented by the Venezuelan *B. grandiceps*. The latter has the peculiarity of giving forth its ponderous inflorescences from the old wood of the trunk and larger limbs. It is also found in the woods of southeastern Panama.

THE GENUS BROWNEOPSIS.

In 1905 the lamented Dr. J. Huber established this genus with *B. ucayalina* as type.¹ The characters which differentiate it from *Brownea* are, according to the author, the absence of the sheath (formed, as we shall see, by 2 connate bracteoles), and the rudimentary petals. In Panama I found an apparently undescribed species, in which also the sheath is lacking, but in which the petals are well developed, although of much smaller size than in the species of *Brownea*. If the rudimentary condition of the petals were an essential character, the standing of *Browneopsis* would perhaps be somewhat shaken by this discovery of a transitional form, differing from *Brownea* only by the absence of the connate bracteoles. But there is another feature, in my mind of much greater importance, which seems to have escaped the attention of Dr. Huber. I refer to the number of stamens. It seems certain, namely, that in all true species of *Brownea* these number only 10 or 11, while in *Browneopsis ucayalina* they are 12 to 15, in *B. cauliflora* 15 or more, and in *B. excelsa*, the new Panamanian species, either 14 or 15. It is not unlikely that further investigations of the flowers of the 3 species will show the normal number of stamens to be 15. Thus the differential characters of *Browneopsis* are really the absence of sheath and the larger number of stamens, together with the lesser development of the petals.

The known species of *Browneopsis* are trees of small or middle size. The species found in Panama differ at first inspection from the Amazonian ones in having the inflorescences mostly terminal.

AFFINITIES OF BROWNEA AND BROWNEOPSIS.

The genera *Brownea* and *Browneopsis* form with *Macrolobium*, *Palovea*, *Heterostemon*, *Goniorrhachis*, and *Elizabetha*, a group of the *Caesalpiniaceae*, tribe *Amherstieae*, characterized by the large bracteal envelopes of the inflorescence, which do not fall until after the opening of the flowers is well started, and by certain other structural characters. On account of the absence of bracteoles, *Browneopsis* would stand near *Tachigalia*, but the form of the receptacle and its adherence to the pistillary stipe, the number of the calyx divisions,

¹ Bol. Mus. Goeldi 4: 565. 1905.

the shape of the petals, etc., make it unequivocally a member of the Brownea group, the only other deviation being in the number of stamens.

The generic distribution of this group can hardly be considered as settled, because of the fact that the species are very scantily represented in most herbaria. Much importance seems to have been attached, for instance, to the greater or lesser development of the petals, which is the only character separating *Heterostemon* from *Elizabetha*. I should not be surprised if a further study of these two genera would lead to their fusion and even *Palovea*, differing from the two former mainly by the free stamens, has, in my opinion, only a doubtful standing. These three genera constitute by themselves a group, while *Macrolobium*, with the upper petal abnormally developed, forms another, transitional toward *Eperua*, and *Brownea* a third, remarkable for its structural uniformity through a large number of specific forms. Through the cauliflorous *B. macrophylla* it leads again into *Browneopsis*, while *Browneopsis excelsa* establishes another link between this genus and the Browneas with terminal inflorescences.

The following descriptions in these two genera are only of species represented in the U. S. National Herbarium:

PANAMANIAN AND VENEZUELAN SPECIES OF BROWNEA.

KEY TO THE SPECIES.

Leaves 5 to 15-jugate. (MULTIJUGATAE.)

- Rachis of leaves densely brownish-hairy; seeds flattened;
young shoots 4-sulcate..... 1. *B. grandiceps*.
- Rachis of leaves glabrescent; seeds quite thick; young
shoots terete..... 2. *B. ariza*.

Leaves 2 to 6-jugate. (PAUCIJUGATAE.)

- Pods narrow (not over 1.5 cm. broad); leaflets short and
broad..... 3. *B. guaraba*.

Pods broad (3 cm. or more).

- Floral sheath about equal to the receptacle tube; clusters
few-flowered..... 4. *B. aroensis*.

Floral sheath distinctly longer than the receptacle
tube.

Leaflets eglandulose.

- Pedicels 7 to 8 mm. long, thick..... 5. *B. coccinea*.

- Pedicels 9 to 15 mm. long, slender; floral
clusters single, few-flowered..... 6. *B. speciosa*.

Leaflets with a basal gland.

- Floral clusters on stem only; leaflets 3 to 6 pairs. 7. *B. macrophylla*.

Floral clusters axillary or terminal.

- Leaves mostly 2-jugate; terminal leaflets
up to 40 cm. long..... 8. *B. rosa-del-monte*.

- Leaves mostly 3-jugate; terminal leaflets
about 16 cm. long..... 9. *B. latifolia*.

1. *Brownea grandiceps* Jacq. Coll. Bot. 3: 287. 1789.

A tree varying in stature from 3¹ to 20 meters,² the trunk erect and branching from the base. Bark brownish, shaggy; cross section of the whitish wood showing distinctly a cross formed by the medullary rays. Young shoots 4-sulcate and densely ferruginous-hairy.

Leaves 5 to 15-jugate; rachis 10 to 45 cm. long, terete, subsulcate, brownish-tomentose; petioles 2 to 10 mm. long. Leaflets opposite or subopposite, eglandulose; petioles 2 to 3 mm. long, stout, terete, densely brownish-tomentose; blades ovate, elliptic, or obovate-lanceolate, long cuspidate acuminate, oblique and rounded or subemarginate at the base with the broader lobe inside, the basal ones 5 to 10 cm. long, 2.5 to 3 cm. broad, the others 12 to 15 cm. long, 3.5 to 4.5 cm. broad. Nervation impressed above, prominent beneath, the costa hairy, the primary veins doubly anastomosed along the undulate margin. Leaf buds drooping, wrapped in 3 to 5 stipules, these obovate-acuminate, 15 to 40 cm. long, about 5 cm. broad, pink, pubescent outside.³

Floral spikes terminal, solitary, sessile, forming ovate heads often of considerable size, but usually from 10 to 15 cm. in diameter. Bracts numerous, obovate-attenuate, caducous, whitish brown hairy without, pubescent within, the exterior ones 5 to 10 cm. long, 2 to 3 cm. broad, subacute, the interior ones smaller. Floral pedicels 9 to 10 mm. long, densely covered with pale brown hairs. Sheath 2.5 to 2.7 cm. long, subcampanulate, the lobes obtuse and distinctly 1-costate, densely pale brown hairy without, glabrous within. Receptacle tube 1.7 cm. long, widening from base to tip, glabrous or glabrescent without, hairy within. Sepals 4, glabrous, 2.2 to 2.5 cm. long, rounded at tip, the anterior one 15 mm. broad and slightly emarginate, the others 9 to 12 mm. broad. Petals broadly obovate-spatulate, 4.4 cm. long, 2 cm. broad, attenuate at the base into a claw 1.5 cm. long, often subemarginate at the tip, pale pink or red, glabrous. Stamens 11, 4.2 to 4.8 cm. long, connate at the base into a tube 8 mm. long, densely hairy inside; filaments glabrous, subulate; anthers about 5 mm. long, 2 mm. broad. Pistil about 5 cm. long (stipe 1.5 cm., ovary 1.2 cm., style 2.3 cm.); stipe and ovary densely whitish-tomentose; style glabrous.

Pod flattened, broad,⁴ with few flattened seeds.¹

VENEZUELA: "Circa Caracas, in sylvaticis montanis," *Jacquin* (type). Near Cumana, Curiepe, Caracas, and La Victoria, flowers, December, *Humboldt & Bonpland*; Siquire Valley, State of Miranda, in woods, altitude 450 to 600 meters, flowers, March 20, 1913, *Pittier* 5969.

This is a well-defined type, characterized by its abundant, mostly tomentose and brownish indument, its many-jugate leaves forming at first showy purple bunches at the ends of the branchlets, and its large inflorescences, each of which contains, according to Bonpland, from 400 to 500 flowers. The tree is highly ornamental and worth the attention of the landscape gardeners interested in tropical projects. Its area seems to be limited to the hills of the "tierra caliente" of the lower belt of Venezuela, where it is known as "palo de cruz" or "rosa de montaña."

2. *Brownea ariza* Benth. Pl. Hartw. 171. 1857.

PLATES 59—62.

A tree 5 to 8 meters high, with a rounded-depressed crown. Young branchlets ferruginous-hairy.

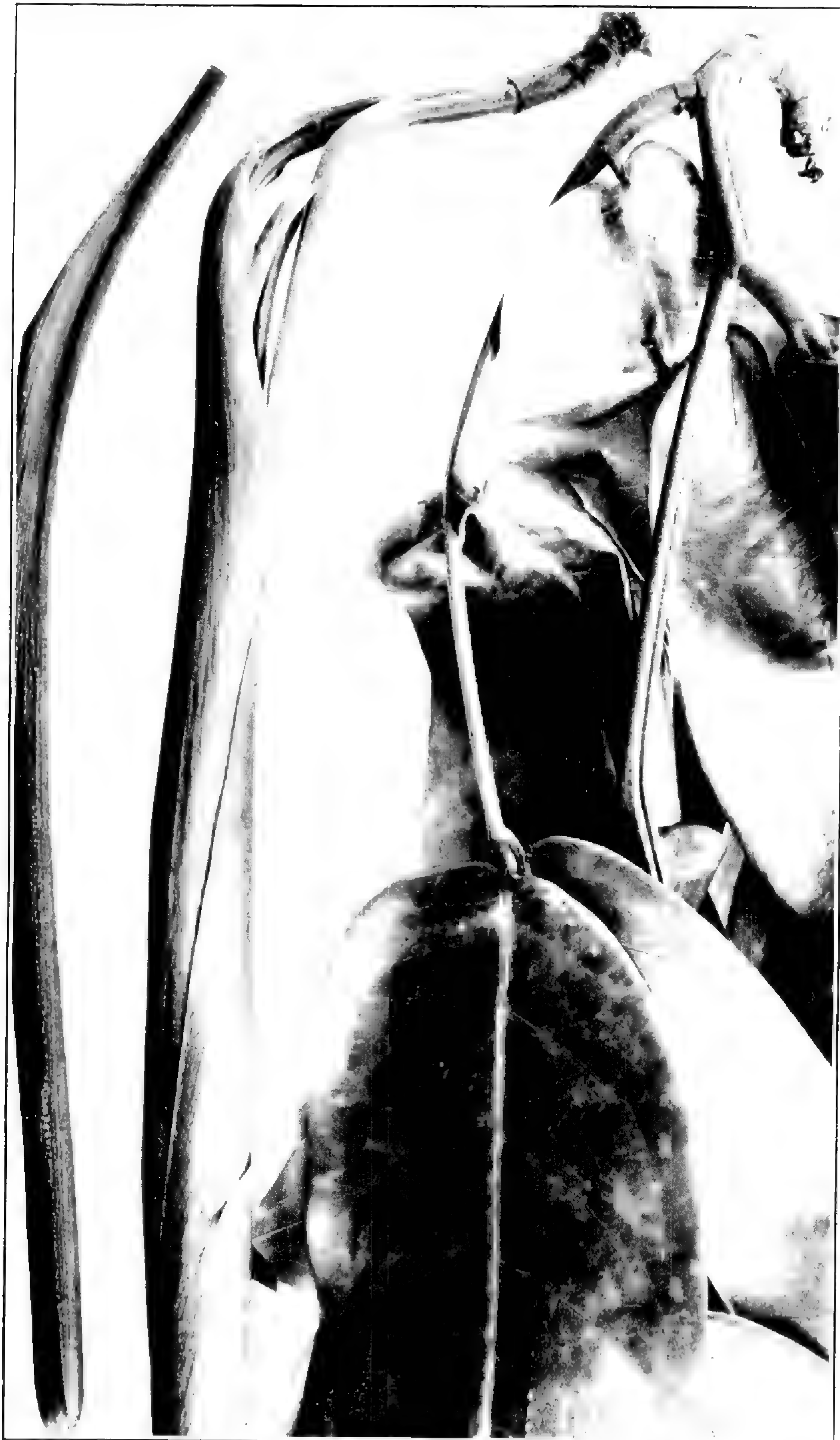
Leaves paripinnate, with 6 to 10 pairs (or seldom more or fewer) of subcoriaceous leaflets, all opposite or subopposite. Rachis up to 40 cm. long, terete or obscurely

¹ Jacq. loc. cit.

² H. B. K. Nov. Gen. & Sp. 6: 313. 1823.

³ When fresh from the bud, the leaves are lax and drooping and show a thick rachis, densely covered with shaggy whitish brown hairs, the leaflets narrowly laciniate, exstipulate, long-apiculate, of a beautiful purple color, the midrib marked by a thick line of snow-white hairs.

⁴ Pittier in notes.



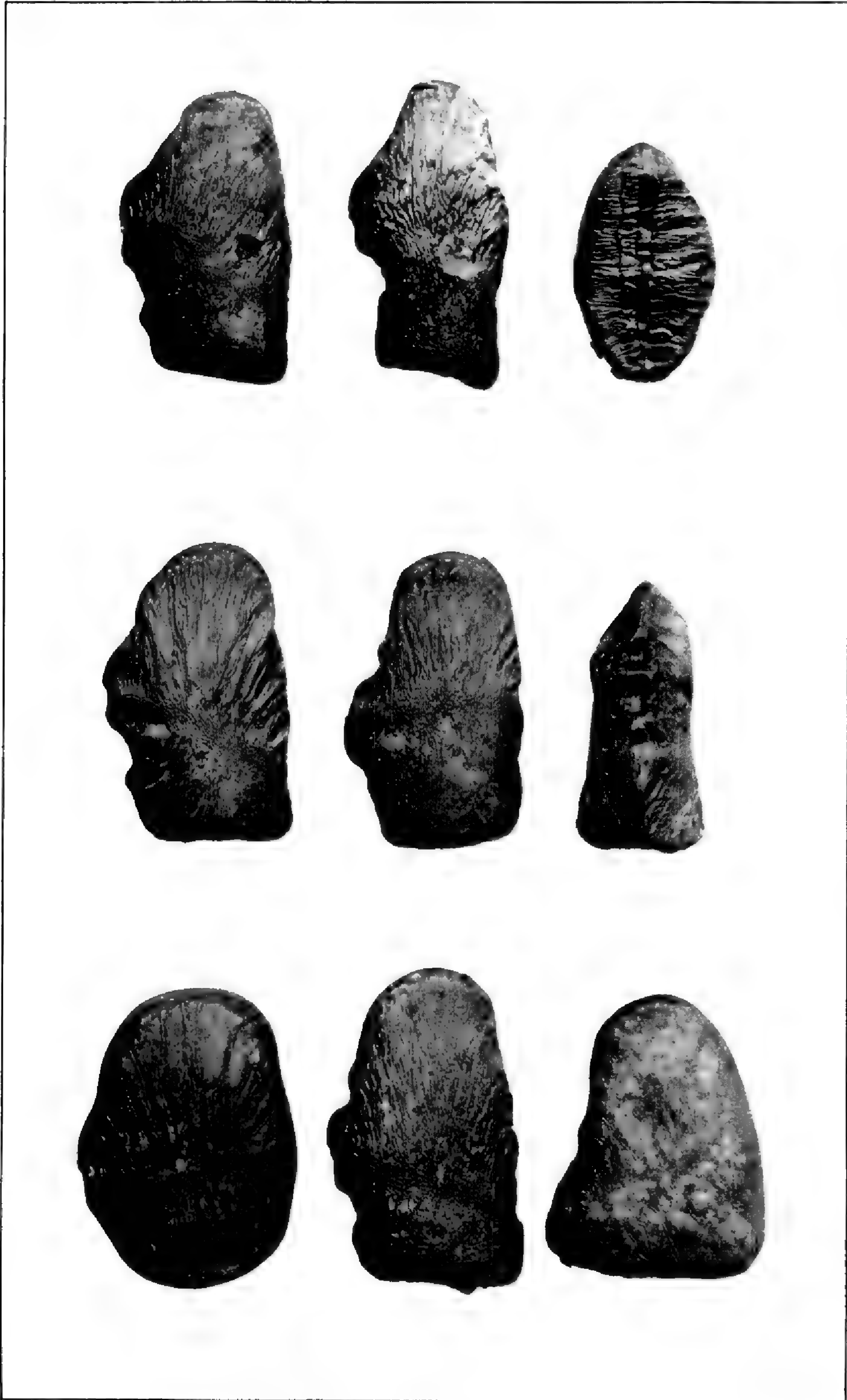
BROWNEA ARIZA BENTH.



BROWNEA ARIZA BENTH.



BROWNEA ARIZA BENTH.



SEEDS OF BROWNEA ARIZA BENTH.

striate, pubescent in young leaves, more or less smooth, verruculose and reddish later; petiole short (1 to 1.5 cm.), hairy or glabrescent. Petiolules 6 mm. long, pubescent or glabrous. Blades of the smaller basal leaflets ovate or ovate-elliptic, cordate, long-cuspidate, the smallest ones 3 cm. long and 1 cm. broad. Blades of the remaining leaflets elliptic, long-acuminate, rounded, oblique, and more or less emarginate at the base, 8 to 16 cm. long, 2 to 5 cm. broad, the broader half on the inside. Stipules linear, narrow, acuminate, caducous; stipels linear, 1 cm. long, caducous.

Inflorescence axillary or terminal, densely flowered, the rachis of the spike more or less hairy. Bracts pinkish, whitish-tomentose outside, broadly ovate and about 4 cm. long at the base of the spikes, narrowing at the tip to a narrow spatulate or linear appendage. Flowers scarlet pink, in the axils of the bracts. Pedicels rather slender, hairy, 7 to 8 mm. long. Sheath 2.5 cm. long, tubular and slightly wider at tip, finely pubescent outside, unequally cleft and bilabiate at tip, the lobes subacute. Receptacle tube 1.7 cm. long, slightly obconical, subangulose, glabrous outside, hairy inside. Sepals 4, 1.8 cm. long, free, the anterior one broad (about 15 mm.) and subemarginate at the rounded tip, the others narrow (8 mm.), elliptic, and emarginate at tip. Petals 3.4 to 3.5 cm. long, 1.2 to 1.3 cm. broad, obovate-spatulate, the lateral ones narrower, more or less oblique and irregular, the claw long and slender. Stamens 11, free or slightly connate at the base, 3.5 to 4 cm. long, slightly arcuate, the connate part of the filaments hairy inside, the anthers ovate, elliptic, 3.5 mm. long. Pistil a little over 6 cm. long from base of receptacle, the ovary densely pilose-pubescent, the style glabrous or very sparsely hairy and ending in a very small capitellate stigma.

Legume 15 to 18 cm. long, 4.5 to 5 cm. broad, single or 2 to each flower head, borne on a pedicel 2.5 cm. long, often surrounded by the persistent bractlets, short-stipitate (stipe about 7 mm. long), compressed, sulcate on the dorsal suture, bisulcate on the ventral one, 4-seeded, apiculate, yellowish or brownish hirsute-tomentose on the surface, expelling the seeds by the curling of the valves. Seeds elliptic-ovate, depressed, 5 cm. long, 2.5 cm. broad, and 1.5 cm. thick, both faces rugose and irregularly striate, the umbilicus salient and the omphalodic band extending all around the margin.

COLOMBIA: In forests near Guaduas, Province of Bogotá, Colombia, at an altitude of about 450 meters (type). Santa Marta, *H. H. Smith* 931; Calí, Cauca, flowers, December 13, 1905, *Pittier* 613. (Both in U. S. Nat. Herb.)

PANAMA: Hospital grounds at Ancon, Canal Zone, cultivated, flowers and fruit, February 13, 1911, *Pittier* 2722 (U. S. Nat. Herb.).

There are some small discrepancies between Bentham's very brief description and mine, as well as differences between specimens of distinct origin. Thus, the sheath was found in every case to be less than twice the length of the receptacle tube and not thrice as long as indicated by the above author, and while the stamens are free to the base, as in the type, in the specimen from Santa Marta, they show a slight adherence in those from Calí and Ancon. On the whole, however, the evidence is such as to leave no doubt as to the identity of our plant with that collected by Hartweg.

The specimens from Calí and Ancon were collected from cultivated trees. *Brownea ariza* is indeed, as are several other species of the same genus, a beautiful ornament of tropical parks and gardens. The large tree at Ancon is about 5 meters high, with a depressed, spreading crown and drooping boughs. The dense foliage itself, with the new leaves brightly purple-colored and hanging in heavy bunches, never fails to attract the eye, and the crimson heads of the flowers are of a gorgeous beauty.

If, however, the number of 400 to 500 flowers in each spike, as given by Bonpland for *Brownea grandiceps*, is exact, *B. ariza* probably remains far behind. Thirty-five to 50 flowers on one head were found opened at one time on the tree at Ancon. Anthesis begins at the base of the spike and as the sterile flowers fall, others appear on the following whorls of bracts. The pods are usually terminal on the axis of the spike.

The specific name *ariza*, from the Spanish "arizá," applied also to *B. macrophylla*, is not, as might be supposed, an aboriginal word. There was, about 1772, a governor of the Province of Darien called Don Andrés de Arizá, and it is not unlikely that the flower was named after him.

EXPLANATION OF PLATES 59-62.—Pl. 59, young leaves and sheathing stipules, Hope Gardens, Jamaica. Pl. 60, inflorescence and leaves, Cauca, Colombia, Pittier 613. Pl. 61, inflorescence and legume, Hope Gardens, Jamaica. Pl. 62, seeds, Ancon, Panama, Pittier 2722. All natural size. Plates 59 and 61 are from photographs by G. N. Collins.

3. *Brownea guaraba* Pittier, sp. nov.

A small tree. Branchlets slender, verruculose, 4-sulcate.

Leaves paripinnate, 2 to 4-jugate, entirely glabrous; rachis obscurely sulcate at base, 2.5 to 12 cm. long, greenish brown; petioles 6 to 8 mm. long; petiolules thick, terete, blackish, 5 to 7 mm. long; leaflets subopposite, broadly ovate, long-acuminate, 6.5 to 10 cm. long, 4 to 7 cm. broad, the basal pair smaller, distinctly cordate and almost orbicular, the others oblique, scarcely emarginate, 1-glandular at the base on the exterior side of the costa. Stipules not seen.

Inflorescence terminal, of few-flowered clusters. Bracts caducous, not seen. Peduncle short (1 cm.) and thick; pedicels about 1.1 cm. long, pubescent, thickening toward the tip. Sheath bilabiate, 2.5 cm. long, deeply cleft on one side, minutely pubescent, the lobes obtuse. Receptacle tube obconical, 1.8 cm. long, 6.7 mm. in diameter at tip, glabrescent. Calyx lobes 4, 2.5 cm. long, obtuse at tip, the anterior 1.2 cm. broad, the others about half narrower. Petals 5, obovate, attenuate into a long claw, 3.7 to 4 cm. long, 9 to 11 mm. broad, pink. Stamens 10 or 11, 3.8 to 4 cm. long, connate for more than half their length, minutely pubescent, often reduced to broad staminodes; anthers ovate. Pistil 6 cm. long, long-stipitate; ovary 8 to 10 mm. long, 10 to 12-ovulate, whitish pubescent; style glabrous; stigma capitellate, papillose, dark purple.

Pods stipitate, glabrous, 12 to 18 cm. long, 1.5 cm. broad. Seeds ovate, thin, narrowly winged, about 2 cm. long and 1 cm. broad, germinating in the pod.

Type in the U. S. National Herbarium, no. 602100, collected near Palmasola, State of Lara, Venezuela, near sea level in the forests around the Aroa River, flowers and fruits, June 27, 1913, by H. Pittier (no. 6366).

This species departs from all those hitherto described by two important characters, viz, the very short and broad leaflets, and the narrow, elongate pods. It grows in the dense woods of the coastal plain at the entrance of the Aroa valley, mixed with *B. aroensis*. The natives distinguish it from the latter, which they call "rosa macho," by the name of "rosa guaraba."

4. *Brownea aroensis* Pittier, sp. nov.

A forest tree up to 15 meters high, the trunk up to 40 cm. in diameter at the base.

Leaves 2 to 6-jugate; rachis 8 to 25 cm. long, slender, subangulate, glabrous or sparsely pubescent; petioles 6 to 20 mm. long; leaflets opposite, glabrous, very variable in size in different parts of the tree; petiolules 4 to 5 mm. long; leaflet blades elliptic, 5 to 11 cm. long, 2 to 4.5 cm. broad, oblique, the basal pair smaller, rounded (and ovate), or more or less emarginate at the base, the following leaflets (almost opposite) oblique, with the acute half on the outside, a glandule inserted on the side of the costa at the base. Stipules not seen.

Floral clusters single, pendent, few-flowered (10 flowers or less), growing from the stems or limbs or at the end of the branchlets. Peduncles rather slender, 1.5 cm. long, pubescent. Bracts few, caducous. Pedicels 1.5 cm. long, minutely pubescent. Sheath 2.8 cm. long, deeply cleft on one side, minutely pubescent without. Receptacular tube obconical, 2.5 cm. long, about 5 mm. in diameter at tip, minutely pubescent. Sepals 4, 2.7 cm. long, obtuse, glabrous, the anterior one 8 mm., the remaining ones 5 to 6 mm. broad. Petals 5, obovate, obtuse, 5 cm. long, 1.3 cm. broad, pink, attenuate into a claw 1.5 cm. long. Stamens 11, 4.7 to 5 cm. long, connate into a

tube 3.6 cm. long, this villous inside; anthers ovate, 3 mm. long, 1.5 mm. broad. Pistil 7.5 cm. long (stipe about 1.2 cm., ovary 8 to 9 mm., style 5.4 cm.), long-stipitate; ovary densely whitish-pubescent; style glabrous; stigma papillose.

Pod about 16 cm. long, 3 cm. broad, flat, reflexed-apiculate, the ventral suture acute or carinate, slightly winged. Seeds not known.

Type in the U. S. National Herbarium, nos. 602101-3. Collected near Palmasola, State of Lara, Venezuela, in forest along the Aroa River, near sea level. Flowers and fruits, June 27, 1913, by H. Pittier (no. 6367). Known also from Puerto de la Cruz, State of Aragua, flowers, April, 1914, *Jahn* 337.

The general description of *B. racemosa* Jacq. as given by De Candolle¹ would apply to this species, except as to the structure of the calyx, but when the detailed description of Kunth² is taken into consideration, the discrepancies become very evident and show that our plant is really quite distinct. Neither could it be *B. capitella*, because the definition "floribus dense capitatis" would hardly apply to its loose, few-flowered spikes. As there is no other possible name left, we shall have to consider the species new.

5. *Brownea coccinea* Jacq. Stirp. Amer. 95. *pl.* 183. 1788.

A small or middle-sized forest tree, with drooping boughs and rounded crown. Branchlets slender, terete, verruculose.

Leaves 1 to 4-jugate, entirely glabrous; rachis 6 to 16 cm. long, terete or obscurely striate; petiolules thick, blackish, 3 to 5 mm. long; leaflet blades ovate-elliptic, cuspidate, slightly oblique, eglandulose, 7 to 16 cm. long, 2 to 5 cm. broad. Stipules very caducous, not seen.

Inflorescences in many-flowered, rather loose clusters, growing either single from the trunk, limbs, and axils of the leaves, or in 2 or 3-clustered terminal racemes (each cluster with 10 flowers or more). Rachis of the racemes slender, glabrous; peduncles of clusters thick, about 1 cm. long, hairy. Bracts of the cluster about 10, ovate, pinkish, brownish-hairy outside, increasing in size from the basal one, about 2 mm. long and broad, to the interior one, nearly 3.5 cm. long and 3 cm. broad. Floral bracts obovate-spatulate, obtuse, long-stipitate, about 4 cm. long, pubescent, caducous. Pedicels 7 to 8 mm. long, thick, hairy. Sheath 3 cm. long, deeply cleft on one side, usually 2-lobed, sometimes 1-lobed, pubescent. Receptacle tube 1.6 cm. long, obconical, about 6 mm. wide at tip, glabrous outside, villous inside on margin. Sepals 4, 2.1 cm. long, obtuse, glabrous, the anterior one 1.2 cm. broad, the lateral and posterior ones 5 to 6 mm. broad. Petals 5, obovate, obtuse, 3.4 to 3.5 cm. long, 1 to 1.1 cm. broad, pink, attenuate at the base into a claw 1.2 cm. long. Stamens 11, 4 to 4.8 cm. long, connate, villous inside for half their length; anthers broadly ovate, 2.5 mm. long, 1.5 mm. wide. Pistil 6.8 cm. long, with the stipe as long as the receptacle tube; ovary 8 to 9 mm. long, pauciovulate (7 ovules or less), brownish-hairy; style about 3.5 cm. long, hairy only at the base; stigma minute, papillose.

Pods (immature) long-stipitate, sparsely ferruginous-hairy, 10 to 15 cm. long, the ventral suture flat, slightly winged, ridged along the median line, the stipe hairy, about 4 cm. long.

VENEZUELA: "In rupestribus sylvaticis Zaucae, sinus maritimi Venezuelae, ubi florentem Julio inveni," *Jacquin* (type). Guinand Estate, at the Quebrada de Cañaveral, Siquire Valley, State of Miranda, at about 600 meters, flowers and fruits, March 20, 1913, *Pittier* 5960 (U. S. Nat. Herb.).

My specimens agree quite well with both *Jacquin's* description and *Lamarck's* figure,³ so that there is no doubt as to their really representing the type species of the

¹ Prodr. 2: 477. 1825.

² H. B. K. Nov. Gen. & Sp. 6: 312. 1823.

³ Encycl. 3: *pl.* 575. *f.* 1. 1796?

genus. The Zauca Gulf or Bay does not figure on modern maps of Venezuela, but it can be surmised from the type localities of the other Jacquinian species that it is an inlet of the Golfo Triste, in the vicinity of Curiepe and Higuerote—that is to say, a locality in the same district where my no. 5960 was collected.

The vernacular name of *B. coccinea* is also “rosa,” “roso,” “macho.” The tree grows in rocky, shaded gorges and does not seem to be very common.

6. *Brownea speciosa* Reichenb.; DC. Prodr. 2: 477. 1825; Griseb. Fl. Brit. W. Ind. 212. 1864.

A small tree, 6 to 8 meters high. Bark dark gray, verrucose on the younger branchlets.

Leaves paripinnate, 1 to 3-jugate, 4 to 6-foliolate, entirely glabrous; leaflets coriaceous; rachis terete, blackish, more or less verruculose, 4 to 7 cm. long; petiolules thick, 5 mm. long; leaflet blades ovate to obovate, eglandulose, rounded or submarginate at the base, rounded and abruptly acuminate at tip, 7.5 to 16 cm. long, 4 to 7 cm. broad, the basal pair always smaller. Stipules caducous, not seen.

Flowers in fascicles of 6 to 8 at the ends of the branchlets. Bracts caducous, not seen. Peduncles often geminate, thick, about 1.5 cm. long, glabrescent; pedicels 9 to 15 mm. long, slender, pubescent. Sheath funnel-shaped, minutely pubescent, 2.5 cm. long, divided into two lobes, one of the sinuses deeper than the other; lobes about 7 mm. long, ovate, acute. Receptacle tube 1.4 to 1.5 cm. long, stiff, broadened at the tip (5 mm. wide) pubescent; calyx lobes 4, glabrous, the anterior one ovate-oblong, often submarginate, 2.5 cm. long, 1.2 cm. broad, the remaining ones narrowly elliptic, 2.5 cm. long, 7 mm. broad, all obtuse at tip. Petals 5, obovate, attenuate into a narrow claw 3.5 to 3.7 cm. long, 1.3 to 1.7 cm. broad, rounded or obscurely emarginate at tip, glabrous, pink. Stamens 10 or 11, unequal, 5.2 to 5.6 cm. long, all united from the base into a tube 3.5 cm. long and free only for the upper 2 cm. or so; anthers ovate, about 3.5 mm. long and 2.2 mm. broad. Pistil 6.8 cm. long, long-stipitate; ovary 7 to 8 mm. long, 7-ovulate, densely whitish-pubescent; style 4.7 cm. long, slender, glabrous; stigma capitellate, papillose, dark purple.

Fruit not collected.¹

VENEZUELA: Valley of Río Limón, on the new road from Maracay to Ocumare de la Costa, Aragua, altitude about 700 meters, flowers, April 18, 1913, *Pittier* 6054 (U. S. Nat. Herb.).

7. *Brownea macrophylla* Linden, Cat. no. 18. 11. 1863; Gard. Chron. 1873: 777. f. 149. 1873.

A tree 6 to 12 meters high, the trunk 20 to 35 cm. in diameter, with sparse ramification. Young twigs villous.

Leaves paripinnate, large, with 3 to 6 pairs of leaflets; rachis 20 to 40 cm. long, subsulcate toward the base, more or less terete, unevenly villous-pubescent; petiole 1 to 1.5 cm. long, thick, terete. Lower and terminal pairs of leaflets opposite, the intermediate ones more or less alternate-distichous; petiolules 5 to 6 mm. long, rather thick, densely pilose-pubescent; leaflet blades elliptic-lanceolate, rounded or subcuneate and glandular at the base, ending with a long, acute acumen, the first pair, close to the insertion of the petiole, about 10 cm. long and 2 cm. broad, the terminal pair largest, 32 cm. long and 7.5 cm. broad; costa prominent beneath the blade and villous, the rest of the leaflet glabrescent and eglandulose.

Flowers 30 to 50 together in large capitate spikes, growing profusely on the surface of the trunk, from base to top, and sometimes on the larger limbs. Bracts large, broadly ovate and from 2 to 5 cm. long, at base of spike, obovate-elliptic, about 6 cm. long and narrowing to 2 mm. near end of the same, all pinkish white, more or less pubescent outside and sparsely so inside. Flowers fire-red, in the axils of the bracts;

¹ If I remember correctly, it is broad and flat, as in *B. coccinea*.

pedicels about 4 mm. long. Sheath 3.5 to 4 cm. long, subcampanulate, densely grayish-tomentose outside, smooth inside, bilabiate at tip, the lobes rounded, about 1.2 cm. long, the anterior one slightly broader than the posterior. Receptacular tube about 1.7 cm. long, cylindrical but somewhat broadened at tip; divisions of calyx 4, more or less connate at the base, obovate-elliptic, glabrous, all 3 cm. long, but the anterior one rounded and emarginate at the tip, 1.3 cm. broad, the 3 remaining ones subacute and only 5 to 7 mm. broad. Petals 5 cm. long, spatulate, attenuate at the base into a long slender claw, rounded and obtusely subulate at tip, one of them almost symmetrical and 1 cm. broad, the 4 remaining ones oblique and narrower. Stamens 11, connate for about 2 cm. at the base, 10 to 11 cm. long; filaments attenuate and subulate at the tip; anthers ovate, about 4 mm. long. Pistil 12 to 12.5 cm. long; ovary long-stipitate (stipe about 2.2 cm.), densely tomentose, with about 12 ovules; style (about 8.5 cm. long) filiform, arcuate, attenuate, sparsely pubescent at the base, glabrous at tip; stigma capitellate, spherical.

Legume not known.

COLOMBIA: Antioquia, *Linden* (type).

PANAMA: Forests around Boca de Pauarandó, Sambú Valley, southern Darien, flowers, February 5, 1912, *Pittier* 5591 (U. S. Nat. Herb.); forests around Pinogana, southern Darien, flowers, April 22, 1914, *Pittier* 6571; slopes of Cerro Pírre, southern Darien, leaves only, June, 1914, *Pittier* 6973.

The name *Brownea macrophylla* appears for the first time in 1863, in a garden catalogue, and the nearest approach to a description is an incomplete account by Masters, accompanying a poor figure, in the *Gardener's Chronicle* for 1873.¹ The illustration represents a dwarfed specimen growing in the greenhouses of W. H. Crawford, Esq., at Lakeville, near Cork, Ireland. The circumstance that *Linden's* plant is said to be a native of Antioquia, a State of Colombia, close to Darien, in Panama, where our specimens were collected, and certain peculiarities reported in the cited account, lead to the conclusion that the tree seen by me in all its tropical exuberance and splendor is the same as the one growing in European greenhouses under the above name.

With *B. cauliflora* Poepp. & Endl., *B. macrophylla* *Linden* forms a peculiar section of the genus, characterized by having the inflorescences always growing from the old wood of the trunk and larger limbs. The former species is a native of the Amazonian Peru and differs from the latter by the reduced number of leaflets, the larger number of stamens (15 to 20?), and the reduced proportions of its flowers.

At blooming time, *Brownea macrophylla* is one of the most striking features of the foothill belt in the Sambú Valley. In the semidarkness of the dense tropical forest, its erect stems, entirely covered by the red blossoms, and showing for an instant between the trunks of the larger trees, strike the eye of the traveller almost as would lightning. Among the natives it is called "arizá," a name which applies also to another species growing in Colombia.

In every investigated case, the trunk of *Brownea macrophylla* was found to be hollow and inhabited by a medium-sized black ant. The blossoms also were almost invariably worm-eaten and full of grubs.

8. *Brownea rosa-del-monte* Berg, Phil. Trans. London 63: 174. pl. 8, 9. 1773.²

A tree 3 to 10 meters high, the trunk up to 25 cm. thick at the base. Bark grayish, rugose on main stem, more or less smooth and verruculose on the limbs.

Leaves entirely glabrous, with 1 to 3 pairs of opposite leaflets, the terminal ones much larger. Rachis 7 to 15 cm. long, thick, the short (about 1 cm. long) petiolar part thicker and dark-colored, the petiolules also thick, 5 mm. long. Blades of the basal

¹ Pages 777, 779.

² The bibliographic reference for this species is wrong in *De Candolle's Prodrômus*, the *Index Kewensis*, and several other publications.

leaflets ovate, rounded or subcordate at the base, acutely long-cuspidate, 12 to 18 cm. long, 4 to 7 cm. broad. Blades of the terminal leaflets up to 40 cm. long and 11 cm. broad, elliptic, cuneate-rounded or more or less rounded at base, long-cuspidate. Costa and lateral veins prominent beneath, the latter arcuate and twice anastomosed along the margin. Minor venation finely reticulate.

Inflorescence terminal, almost sessile on branchlets often defoliated at blooming time; flowers pink. Bracts pubescent outside, broadly ovate and clasping at the base of the flower head, narrowing toward the top into a linear appendage 5 cm. long, all pale pink. Pedicels 5 mm. long, hairy. Sheath tubular-campanulate, bilabiate, nearly 4 cm. long, hairy-tomentose outside, the lobes not over 5 mm. long. Receptacular tube cylindrical, slightly obconic, 2 cm. long. Divisions of the calyx 5, more or less connate at the base, elliptic, rounded or subacute at the tip, 2.5 cm. long. Petals 5, 4 to 6.5 cm. long, the median one spatulate, about 6 mm. broad, the lateral ones oblique, narrower, often irregular or subauriculate. Stamens 11, about 9 cm. long, monadelphous. Pistil 12 cm. long from top of receptacle; ovary hairy-tomentose; style slender and glabrous except at the base; stigma capitellate.

Legume 12 to 14 cm. long, 4 cm. broad, short-stipitate, compressed, winged on the ventral side with the suture salient in the form of a sharp ridge, narrowly furrowed along the dorsal side, 3 or 4-seeded, ending in a short, thick apex, pale brown pubescent, dehiscent. Mature seeds not seen.

PANAMA: In montosis Tierra Firme, Porto Bello, *Pihl* (type). Wooded hills of Sperdi near Puerto Obaldía, San Blas Coast; a single tree, in blossom, the inflorescence half worm-eaten, September 8, 1911, *Pittier* 4408. In forests around Porto Bello, flowers and fruits, March 22, 1914, *N. F. Petersen* (*Pittier* 6522). (Two latter in U. S. Nat. Herb.)

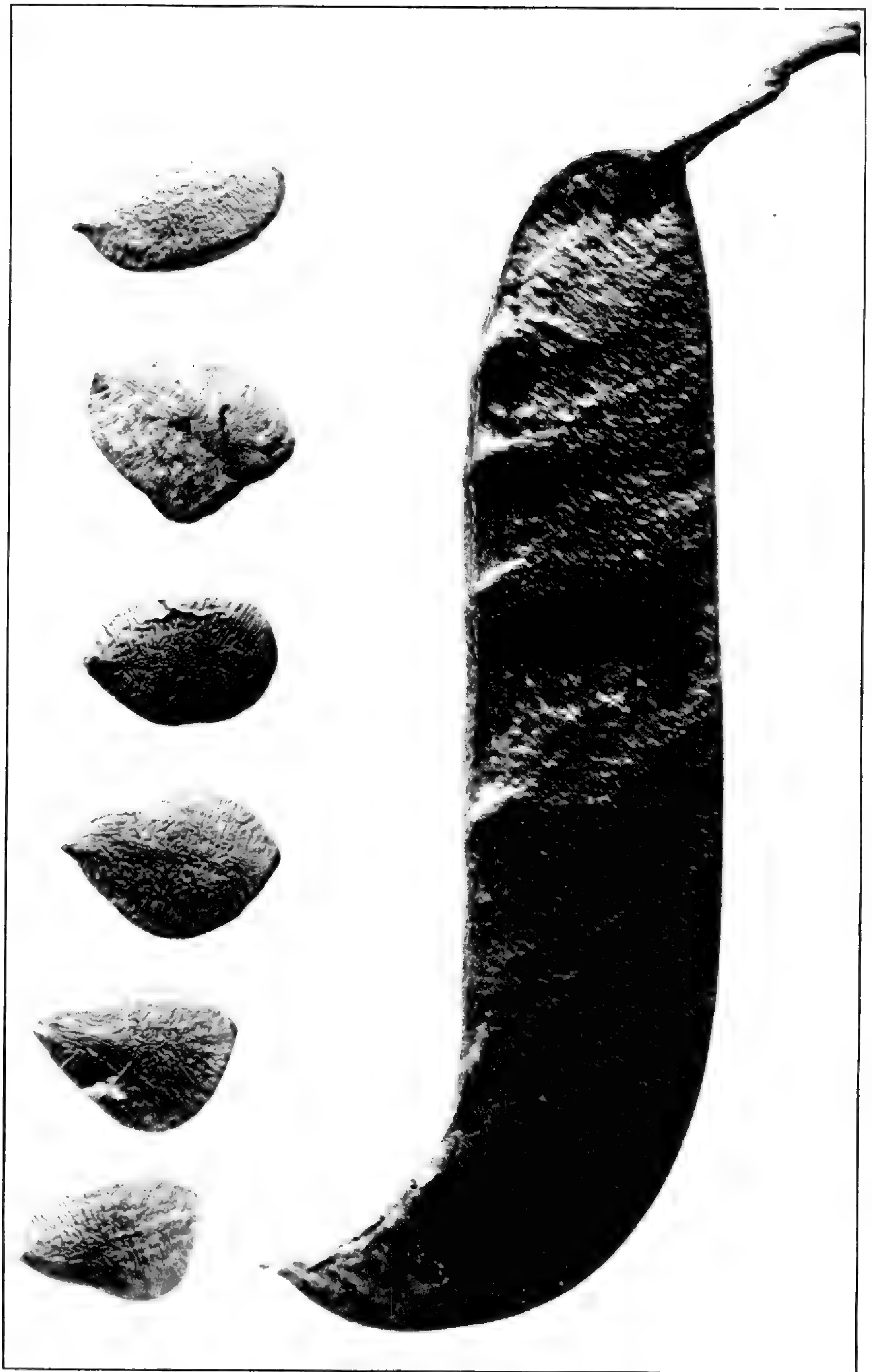
The type of this species was collected, as were our own specimens, in the Regenwälder of the Atlantic watershed of Panama. De Candolle gives as its synonym the *Hermesias* of Loeffling, and Grisebach tries to identify it with a *Brownea coccinea* Loebl., to which no other reference is found. Both authors have evidently erred. Berg's description applies quite satisfactorily to the Sperdi plant and this is altogether distinct from any known Venezuelan species. It is perhaps more closely related to *B. negrensis* Benth., but differs by the unusual size of the terminal leaflets, the relative proportions of the flower parts, and the sepals apparently all free, a case unique in the genus.

The specific name *rosa-del-monte* cannot be declined and so is hardly tenable. Some authors have remedied it by simply suppressing the two last words, calling the species *Brownea rosa*. It must be remembered, however, that *rosa* is the generic vernacular name for *Brownea* and that in Panama the name *rosa del monte* is specific for Berg's plant. It is suggested that using *Brownea rosa-montis*, i. e., the direct translation of *rosa-del-monte*, would be the way to set right the defective name originally used.

9. *Brownea latifolia* Jacq. Fragm. Bot. Illustr. 25. pl. 17. 1809.

Leaves 3-jugate, glabrous; rachis 10 cm. long; petiole 1 cm. long; petiolules 5 mm. long, thick; basal leaflet blades ovate-elliptic, long-acuminate, scarcely oblique, 10 cm. long, 4 cm. broad; terminal leaflets obovate-elliptic, quite oblique, the acute half inside, 16 cm. long, 6 cm. broad; all the leaflets with a gland on the inside at the base of the costa.

Inflorescence of 2 or 3-clustered, terminal racemes. Clusters many-flowered. Cluster bracts ovate, increasing in size from the base, sparsely pubescent outside; floral bracts linear, about 2.5 cm. long. Pedicels 5 mm. long, pubescent. Sheath 1.9 mm. long, cleft only a little deeper on one side than on the other, sparsely pubescent, the lobes often slightly emarginate at the tip. Receptacular tube 1.2 mm. long, 4 mm. wide at tip. Sepals 2.2 cm. long, glabrous, the anterior one 9 mm. broad, emarginate at tip, the others 3 mm. broad. Petals 3.8 cm. long, obovate, subemarginate at



POD AND SEEDS OF *BROWNEOPSIS EXCELSA* PITTIER.

tip, attenuate into a claw 1.5 cm. long. Stamens 10 to 12, 4 to 4.5 cm. long, connate, the tube hairy inside for the first 2 cm.; anthers ovate, about 3 mm. long and 1.5 mm. broad. Pistil 6 cm. long (stipe 1.3 cm., ovary 8 to 9 mm., style 3.7 cm.); ovary ferruginous-pubescent; style filiform, glabrous.

Type from Caracas, Venezuela.

Grown in greenhouse of U. S. Department of Agriculture (no. 1840).

A NEW SPECIES OF BROWNEOPSIS.

Browneopsis excelsa Pittier, sp. nov.

PLATE 63.

A large tree, 25 to 30 meters high, with spreading branches drooping at the extremities. Trunk up to about 45 cm. in diameter at the base; bark grayish and more or less smooth.

Leaves paripinnate, glabrous, pink-colored and drooping when young, with 2 or 3 pairs of nearly opposite leaflets. Common petiole 4 to 10 cm. long, slender, terete. Leaflets petiolulate; petiolules 6 mm. long, perfectly straight, terete, dark-colored; blades ovate, long-cuspidate, 3 to 10 cm. long, 1 to 4 cm. broad, subcoriaceous, glandular at the base; costa prominent beneath the leaflet, but venation hardly distinct. Stipules very small and caducous.

Inflorescence mostly terminal, with the flowers in 4 or 5 fascicles at the end of a thick peduncle and surrounded by numerous caducous imbricate bracts. Peduncle thick, 1.2 cm. long, showing the postbracteal scars. Bracts clasping, densely hairy-pubescent outside, the lower ones about 3 mm. long, ovate and subacute, the upper ones 23 to 35 mm. long, 3.5 mm. broad, obovate and more or less truncate at the top. Sheath absent. Receptacular tube thick, coriaceous, angulate, about 8 mm. long; divisions of the calyx 4, petaloid, pale pink, glabrous, 3 of them elliptic, 2.5 cm. long, 5 mm. broad, the fourth clasping the pistil, 1.5 mm. long, 7 mm. broad, almost acute at the tip and with two lateral, acicular, shorter lobules. Petals obovate-elongate, about 30 mm. long and 5 mm. broad, rounded at the tip and attenuate into a long slender claw, pale pink. Stamens 14 or 15, connate at the base, the median ones 35 mm. long, the lateral ones shorter; filaments smooth, arcuate; anthers nearly 10 mm. long, versatile. Pistil 6.4 cm. long from tip of receptacular tube; ovary stipitate, multiovulate, densely covered with a pale brownish gray pubescence; style smooth, slender, 4 cm. long; stigma capitellate.

Legume about 18 cm. long, 3.5 cm. broad, stipitate (stipe 3 cm. long), bivalvate and dehiscent, coriaceous, many-seeded, falcate and rostrate at the apex, covered with an evanescent cinnamon-brown indument; peduncle 2.5 to 3 cm. long. Seeds ovoid, flattened, 25 to 30 mm. long and 17 to 22 mm. broad.

Type in the U. S. National Herbarium, nos. 715759-61, collected in forest near Garachiné, southern Darien, Panama, flowers, January 28, fruit (immature), February 11, 1912, by H. Pittier (no. 5511).

Represented also by specimens collected in the vicinity of Marraganti, on the Zurya River, southern Darien, immature fruit, April, 1908, *R. S. Williams* 1011 (U. S. Nat. Herb.).

EXPLANATION OF PLATE 63.—Pod and seeds, from Pinogana, southern Darien, *Pittier*. Natural size.

ANACARDIACEAE.

AN OLD AND A NEW SPECIES OF TAPIRIRA.

Tapirira myriantha Triana & Planch. Ann. Sci. Nat. Bot. V. 14: 295. 1872.

A large tree, 25 meters high or more, the trunk 80 cm. in diameter at the base; ramification ascending, irregular; crown rounded, depressed; bark of the trunk and limbs grayish, rimose, that of the younger twigs grayish brown, dotted with numerous lenticels.

Leaves alternate, imparipinnate, with 5 to 9 leaflets. Rachis 8 to 18 cm. long, minutely pubescent, the petiole about 6 cm. long, thicker and deeply canaliculate at the base. Leaflets petiolulate; petiolules pubescent, those of the lateral leaflets 7 to 10 mm. long, that of the terminal 15 to 18 mm.; leaf blades oblique, oblong or oblong-lanceolate, more or less acute or rounded and uneven at the base, acutely acuminate at tip, 9 to 22 cm. long, 4 to 6 cm. broad; margin entire; venation impressed above, prominent and sparsely pubescent beneath, the primary veins running straight to the margin and then arcuately anastomosed. Panicles axillary at the end of the branchlets, equal in length to the leaves or shorter, ramified and densely flowered. Rachis more or less ferruginous-pubescent. Flowers (only the male ones known) small, pedicellate, 1 to many-clustered. Pedicels not over 1 mm. long, hairy. Calyx hairy, about 0.7 mm. long, 5-lobulate, the lobules rounded-obtuse; petals 5, 1.5 to 1.7 mm. long by 0.5 to 0.7 mm. broad, more or less oblong-elliptic, acute or irregularly denticulate at tip, pale yellow, erect or spreading; stamens 10, the longest hardly exceeding the corolla; anthers orbicular, depressed, emarginate at base, bright yellow; rudimentary pistil obscurely 5-parted at tip.

COLOMBIA: Buenaventura, western coast, *Triana* (type).

PANAMA: Loma de la Gloria, near Fató, Province of Colón, flowers, August 4, 1911, *Pittier* 4101 (U. S. Nat. Herb.).

Differs from *T. guianensis* Aubl. by its larger, always acutely acuminate leaflets, its shorter and more compact panicles, and its smaller flowers. Our specimens differ from those described by Triana and Planchon in having from 5 to 9 leaflets instead of the constant number of 5.¹

***Tapirira chagrensis* Pittier, sp. nov.**

A tree about 20 meters high, the trunk 35 to 40 cm. in diameter at the base. Trunk straight, 8 to 10 meters from ground to first limbs. Ramification ascending, irregular; crown elongate, flattened at the top. Bark grayish and rimose on the trunk and larger limbs, light brown, obscurely sulcate, and lenticellose on the younger growth.

Leaves entirely glabrous, 9-foliolate; rachis 12 to 25 cm. long, the petiole 6 to 10 cm., broadly flattened above with expanded base, finely striate longitudinally. Leaflets opposite, petiolulate; petiolules shallowly sulcate with a middle ridge in the furrow, those of the lateral leaflets 1 to 1.5 cm., the terminal one about 3 cm. long. Leaflets coriaceous, oblique, ovate or obovate to elliptic, unequally cuneate at the base, narrowed at the tip into a narrow rounded acumen, 8 to 17 cm. long, 3 to 6.5 cm. broad; margin entire; venation subimpressed and finely reticulate above, prominent beneath, the primary veins profusely connected by transverse veinlets and arcuately anastomosed at their ends.

Panicles axillary to the uppermost leaves, short (12 to 15 cm. long), branching only once, rather few-flowered, more or less pilose-pubescent. Male flowers sessile; calyx about 1.5 mm. long, sparsely hairy outside, the 5 lobules acute or subacute at tip, the corolla white, the petals 5, naviculiform, erect, about 2.8 mm. long and 1 mm. broad, pointed at the tip. Stamens 10, included or slightly exserted; anthers small, yellow. Rudimentary pistil rounded, stiffly hairy. Female flowers and fruit unknown.

Type in the U. S. National Herbarium, no. 678552, collected in forest along the Chagres River above Alhajuela, Province of Panama, Panama, May 13, 1911, male flowers only, by H. Pittier (no. 3503).

This species belongs evidently to *Eutapirira*, but differs obviously from those hitherto described by the absolute smoothness of its leaves, the peculiar appearance of the petioles, and the special disposition of the flowers, which are quite sessile and mostly single along the rachis.

¹ In Mart. Fl. Bras. 12²: 377, Engler curiously attributes to the species of his section *Eutapirira irregularly serrate leaflets*. We have seen the four species described by him as belonging to this section and in all the leaflets have a plainly entire margin, more or less revolute in dry specimens.

HIPPOCRATEACEAE.

A NEW SPECIES OF SALACIA.

Salacia blepharodes Pittier, sp. nov.

FIGURE 88.

A small tree 3 to 4 meters high, with flat, spreading crown. Bark gray, almost smooth. Branchlets divaricate, nodose.

Leaves alternate or subopposite, clustered at the ends of the year's growth, coriaceous, smooth, short-petiolate; petioles 2 to 3 mm. long. Leaf blades ovate-lanceolate to obovate, attenuate at base, rounded or acute at tip, 4 to 6 cm. long, 1.5 to 2.5 cm. broad; margin serrate, revolute.

Inflorescence axillary or on leafless nodes, sessile or almost so, one red flower growing at a time out of a budlike cluster of small brown bracts. Pedicel white, smooth, slender, about 15 mm. long, sheathed at the base in a short bractlet, this brown and fringed on the margin. Calyx, corolla, and disc connate at the base. Sepals ovate and irregular, fringed at the tip, 2 to 2.5 mm. long, 2 mm. broad. Petals irregularly ovate and denticulate, contiguous on their broadest part, narrower and slightly distant at the base, between 2.5 and 3 mm. long and broad. Disc flat, about 2.5 mm. wide. Stamens 5, yellow, inserted on the margin of the disc; filament short (0.8 to 1.2 mm. long), flattened; anthers extrorse, broadly rounded, splitting longitudinally. Ovary 3-celled; style none; stigma obscurely 3-lobulate.

Fruit and seeds unknown.

Type in the U. S. National Herbarium, no. 677476, collected on the outskirts of the forest around El Potrero, Chiriquí Volcano, Panama, at an altitude of 2,800 to 3,000 meters, flowers, March 12, 1911, by H. Pittier (no. 3086).

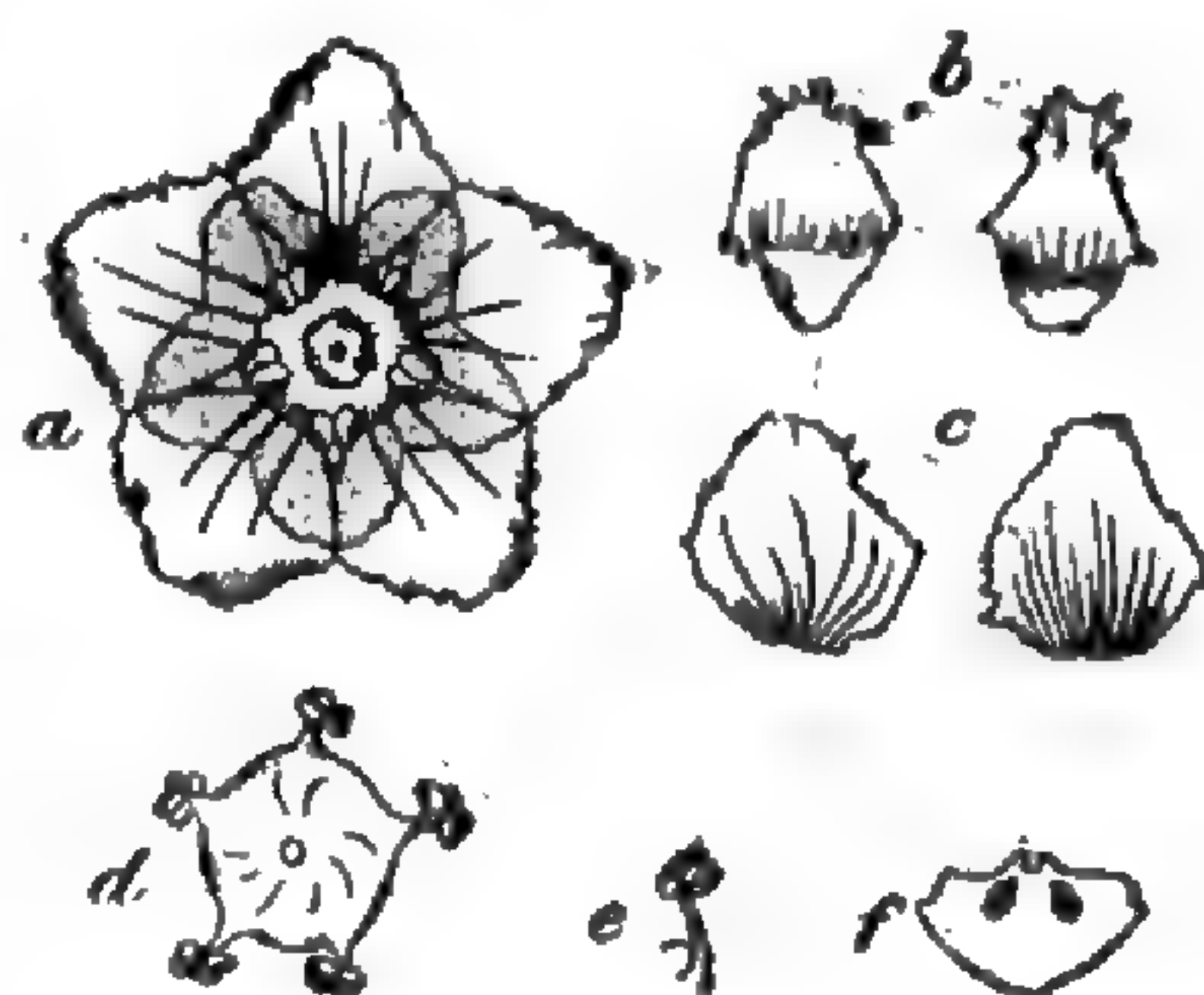


FIG. 88. — *Salacia blepharodes*. *a*, Flower seen from above; *b*, sepals; *c*, petals; *d*, disc and stamens, flattened and out of shape; *e*, stamen; *f*, longitudinal section of ovary. Scale 3.

BOMBACACEAE.

BOMBACOPSIS, A NEW CENTRAL AMERICAN GENUS BETWEEN BOMBAX AND PACHIRA.

Although the late K. Schumann, in the *Pflanzenfamilien*¹ included in a single genus the species of *Bombax* L. and *Pachira* Aubl., the majority of botanists have continued to keep them apart. Notwithstanding the close affinities between the two groups, their separation seems to be fully justified. In the structure of the flower there are clear differences of detail while the differences in the fruit and seeds are fundamental.

CHARACTERS OF BOMBAX.

The staminal tube of *Bombax* is short and thick, and, in *B. bar-rigon*, for instance, is divided first into 5 short fascicles, each of which in turn splits into 2 smaller bunches, containing about 140 stamens each, the filaments of which are free. The petals of *Bombax* are elliptic-lanceolate or ovate and slightly adherent to the staminal

tube, falling with it; in prefloration they are twisted and in the later periods of anthesis both become reflexed and twisted corkscrew-like. The cuplike calyx is almost always short and broad. The capsule is fusiform and filled with a thick wool derived from the endocarp, in which are imbedded numerous seeds, like peas in shape, size, and color. The floral bud is ovoid and relatively short and the whole flower is also thickset with a more or less spherical outline. The flower and fruit structures characteristic of this genus are shown in the accompanying illustrations of *B. barrigon* (pls. 64-67).

CHARACTERS OF PACHIRA.

In *Pachira* the flower is long and slender and the calyx subtubulose; the long petals are laciniate to spatulate and are simply reflexed during the anthesis; the staminal tube is 4 to 6 times as long as in *Bombax* and is more or less distinctly 5-branched. The arrangement of the stamens seems to differ according to the species, the further division of the fascicles being for instance nearly dichotomous in *Pachira macrocarpa* and regularly ramified, with a pectinate arrangement in *Pachira insignis*. The fruit, varying in shape from ovoid, as in *Pachira aquatica* to depressed-globose, as in *Pachira insignis*, is always more or less rounded at base and tip and often attains very large dimensions. The endocarp is silky-lined or somewhat hairy inside, but never woolly, and the seeds, irregularly rounded on account of being crowded together, are of about the size of a chestnut. *Pachira macrocarpa* is illustrated in plates 68 and 69; *P. aquatica* in plates 70 and 71; *P. insignis* in plates 72 and 73.

THE DIFFERENCES SUFFICIENT FOR DISTINCTION.

There are other characters which may help in distinguishing these two genera, but the above, with the aid of the illustrations, are sufficient for our purpose. The general aspect of the flowers and the presence or absence of wool in the fruit are in fact sufficient to distinguish at first sight *Bombax* from *Pachira*. Besides this, as far as indicated by the Panamanian species, the former bloom when the tree is absolutely bare of leaves, while the flowers of the latter are often hidden among the thick foliage, which is always entirely developed at the time of anthesis.

EXPLANATION OF PLATES 64-67.—Pl. 64, flower and floral buds, forest near Old Panama, Panama, *Pittier*. Pl. 65, calyx, style, and stamens of preceding specimen, with section of bud showing arrangement of stamens. Pl. 66, fruit and leaves, Hope Gardens, Jamaica. Pl. 67, fruit with pericarp removed, showing seed mass. Hospital Grounds, Ancon, Canal Zone, Panama, *Pittier*. All natural size. Pl. 66, from photograph by G. N. Collins.

EXPLANATION OF PLATES 68-73.—Pl. 68, androecium of *Pachira macrocarpa*, Nicoya, Costa Rica, *Pittier*. Pl. 69, section of capsule of same species, showing seeds, Chiapas, Mexico. Pl. 70, leaf and androecium of *P. aquatica*, Hope Gardens, Jamaica. Pl. 71, pod of same, Hope Gardens, Jamaica. Pl. 72, flower and fascicle of stamens, *P. insignis*, Caracas, Venezuela, *Pittier*. Pl. 73, fruit of same individual. Pls. 68 to 72 natural size; pl. 73, scale 2/3. Pls. 69 to 71 from photographs by G. N. Collins.



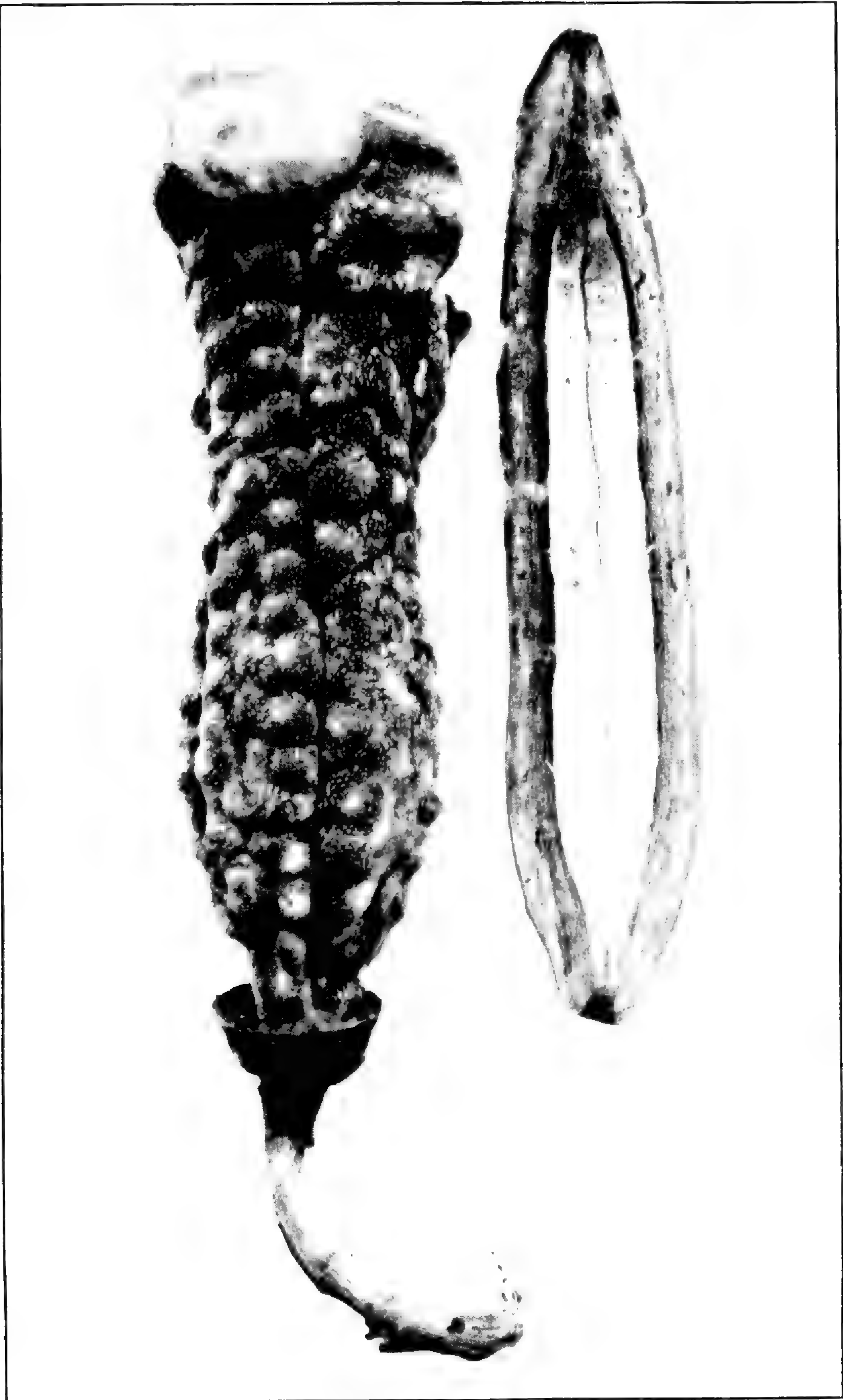
BOMBAX BARRIGON (SEEM.) DECAISNE.



BOMBAX BARRIGON (SEEM.) DECAISNE.



BOMBAX BARRIGON (SEEM.) DECAISNE.



BOMBAX BARRIGON (SEEM.) DECAISNE.



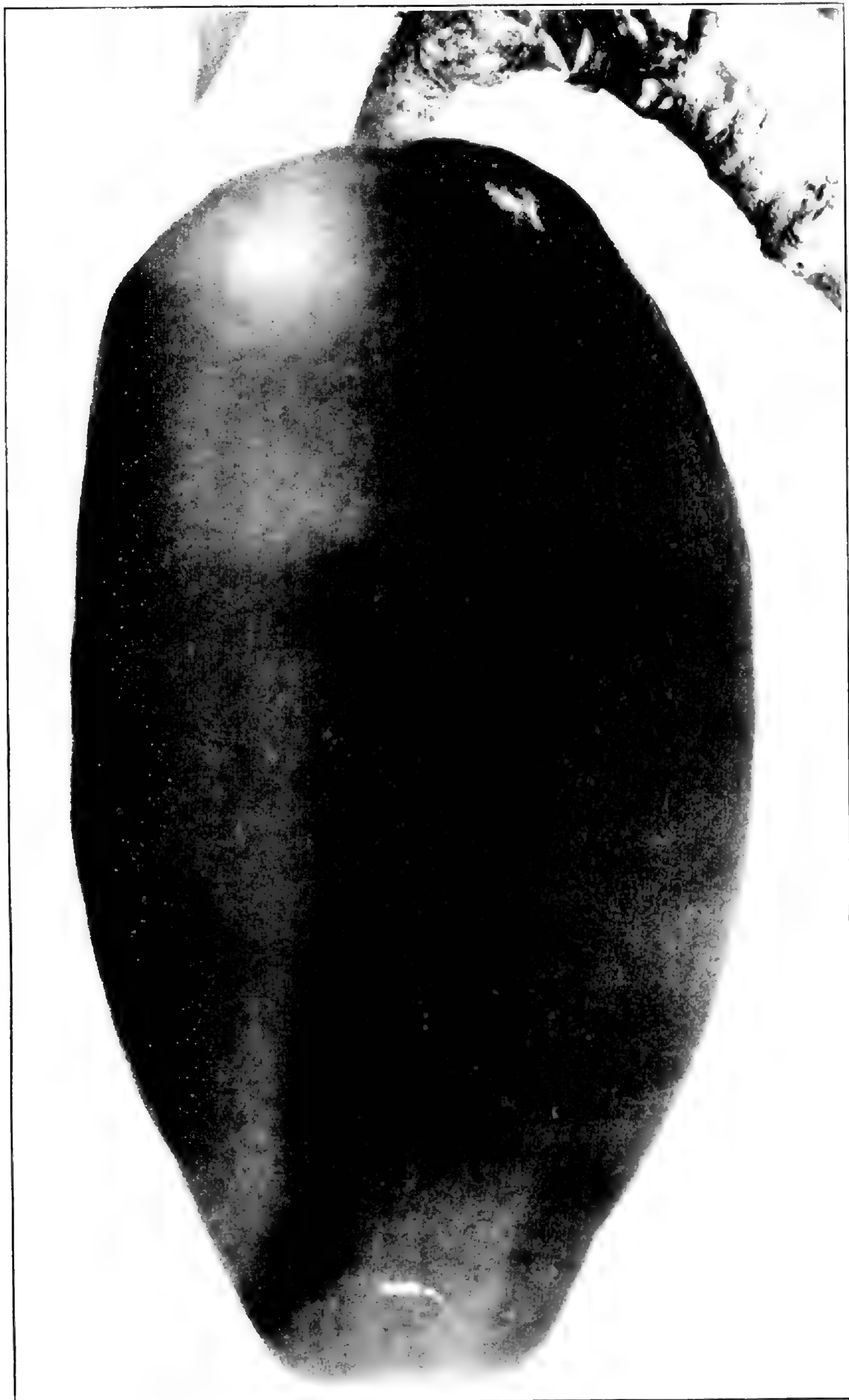
PACHIRA MACROCARPA WALP.



SEEDS OF *PACHIRA MACROCARPA* WALP.



PACHIRA AQUATICA AUBL.



FRUIT OF *PACHIRA AQUATICA* AUBL.



FLOWER OF PACHIRA INSIGNIS SAV.



FRUIT OF *PACHIRA INSIGNIS* SAV.

AN INTERMEDIATE GENUS REQUIRED.

Besides at least 1 species of *Bombax* (*B. barrigon* (Seem.) Decaisne) and 2 of *Pachira* (*P. aquatica* Aubl., *P. villosula* Pittier), there are in Panama 2 other species, considered by both Bentham and Seemann to belong to *Pachira*, but which, according to the generic definition, might just as well stand under *Bombax*. As the fruit of neither of them was known, their being placed in *Pachira* was justified on the ground of the general appearance of the flower. The transfer by Hemsley¹ of *Pachira fendleri* Seem. to *Bombax* was rather guesswork, and it is likely that the peculiarly shaped capsule of that tree would have puzzled to some extent the eminent botanist of the Kew Herbarium. The name of the closely related *Pachira sessilis* Benth. remained unchanged, but its fruit so much resembles that of a *Bombax* that this tree also might with some reason be listed in this genus.

As it is, these two species form a group almost exactly intermediate between *Pachira* and *Bombax*, the flower differing from that of the first only in minor details, and the fruit departing but in one point from the capsule which characterizes *Bombax*.

At first sight the flowers look like miniatures of those of *Pachira*. The calyx is tubular and narrow, the petals are long, laciniate, and inserted on a cufflike disc inclosing the base of the staminal tube. This is again much longer than in *Bombax* and it divides into 5 fascicles in which the staminal filaments are parted from the base.

In *Bombax sessile* (Benth.) Decaisne the fruit has the rounded exterior of that of *Pachira aquatica*, but its seeds are of the size and appearance of a small pea and surrounded by the woolly bed that characterizes *Bombax*. The capsule of *Pachira fendleri* Seem., on the other hand, is quite distinct, being small, with coriaceous instead of woody walls, a pentagonal section, and a truncate apex.

From the above it appears clearly that we have in Panama two Bombacaceae nearly related to *Pachira* and *Bombax*, but which can not be placed in either group. They should then form for themselves a new genus, for which the name "Bombacopsis" is proposed.

KEY TO BOMBAX, PACHIRA, AND BOMBACOPSIS.

The following is a tentative key for the determination of the three genera:

Seeds 1.5 cm. or more in diameter, imbedded in the fleshy dissepiments of the capsule; flowers large and elongated (up to 35 cm. long); staminal fascicles repeatedly branched.....	PACHIRA.
Seeds 6 mm. or less in diameter; flowers rather short (not above 15 cm. long); staminal fascicles dividing at once into single filaments..	
Flowers short and thick; stamens very numerous (about 1,400)..	BOMBAX.
Flowers slender; stamens about 75.....	BOMBACOPSIS.

¹ Biol. Centr. Amer. Bot. 1:124. 1879.

DESCRIPTION OF BOMBACOPSIS AND ITS SPECIES.

Bombacopsis Pittier, gen. nov.

Calyx tubular, obscurely 5-lobulate. Petals 5, laciniate, about 12 times as long as the calyx. Staminal tube divided above into 5 to 8 bundles of free stamens; anthers 1-celled. Ovary 5-celled, the cells with many ovules; style slender, obscurely 5-tipped. Capsule coriaceous or woody, 5-valved, dehiscent, densely woolly inside. Seeds small, subglobose, imbedded in the wool of the endocarp.

Medium-sized deciduous trees, aculeate or unarmed. Leaves digitate, 5 to 7-foliolate; leaflets entire. Inflorescence terminal, few-flowered, loosely paniculate. Peduncles 1 to 3-flowered; pedicels 3-bracteolate. Flowers white or purplish, the petals covered outside with dark-brown or purple scales.

Species 2, in Panama and Costa Rica.

KEY TO THE SPECIES.

- Trunk unarmed; capsule ovoid, woody; flower about 15 cm. long; calyx glandular at the base..... *B. sessilis*.
 Trunk thickly aculeate; capsule coriaceous, 5-angled, truncate; flower about 10 cm. long; calyx eglandular..... *B. fendleri*.

Bombacopsis sessilis (Benth.) Pittier.

Pachira sessilis Benth. Bot. Voy. Sulph. 70. 1844.

A middle-sized or small tree, unarmed, 10 to 20 meters high. Trunk slender, covered with a greenish, smooth, scaling bark. Branchlets rather slender, glabrous, verruculose.

Leaves 5 or 6-foliolate, entirely glabrous. Petioles 5 to 12 cm. long, slightly broadened at the base. Leaflets sessile or subsessile, obovate or oblong, long-cuneate at the base, rounded, emarginate, and mucronate at the tip, the middle one 7.5 to 13 cm. long, 3.5 to 4.5 cm. broad, the lateral ones 4.5 to 10 cm. long, 2 to 4 cm. broad. Margin entire. Venation prominent on both sides, the primary veins straight, anastomosed near the margin.

Flowers forming loose panicles at the ends of the branchlets, opening either when the tree is bare or when the leaves are fully developed. Peduncles usually simple, sometimes 2-flowered, 1 to 1.5 cm. long, 2.2 mm. thick, terete, glabrous. Calyx tubular or subconical, 12 to 13 mm. long, 6 mm. in larger diameter, truncate and obscurely 5-toothed, quite glabrous outside, provided at the base with 5 glands, pubescent inside at the bottom. Petals 14.5 cm. long, laciniate, about 7 mm. broad, rounded at tip, reflexed, minutely tomentose, purplish or greenish purple, at first reflexed, twisted after anthesis. Staminal tube 7.5 cm. long, 2.5 mm. wide, glabrous. Stamens about 6 cm. long, shorter than petals; filaments filiform, white, connate at the base into 6 to 8 bundles, each of these ramifying into 2 or 3 smaller bundles; anthers ovate-oblong, about 2 mm. long. Pistil 16.5 cm. long; ovary pilose-pubescent; style glabrous, deep pink.

Capsule oblong, rounded at both ends, smooth, 5-sulcate, green outside. Wool light brown. Seeds ovate, 11 mm. long, 7.5 mm. thick, chocolate-brown and black-dotted.

Bombacopsis sessilis is a morning bloomer.

PANAMA: "Isle of Taboga, Bay of Panama" (type). Around Culebra, Canal Zone, flowers, January 15, 1911, *Pittier* 2407, 2422. Hospital Grounds at Ancon, Canal Zone, flowers, February 15, 1911, *Pittier* 2726; fruit, March, 1910, *Chas. F. Mason*. (All in U. S. Nat. Herb.)

COSTA RICA: Buenos Aires, Diquís Valley, flowers, February, 1891, *Pittier*, Inst. Fís. Geogr. Costa Rica, no. 3924. (U. S. Nat. Herb.)



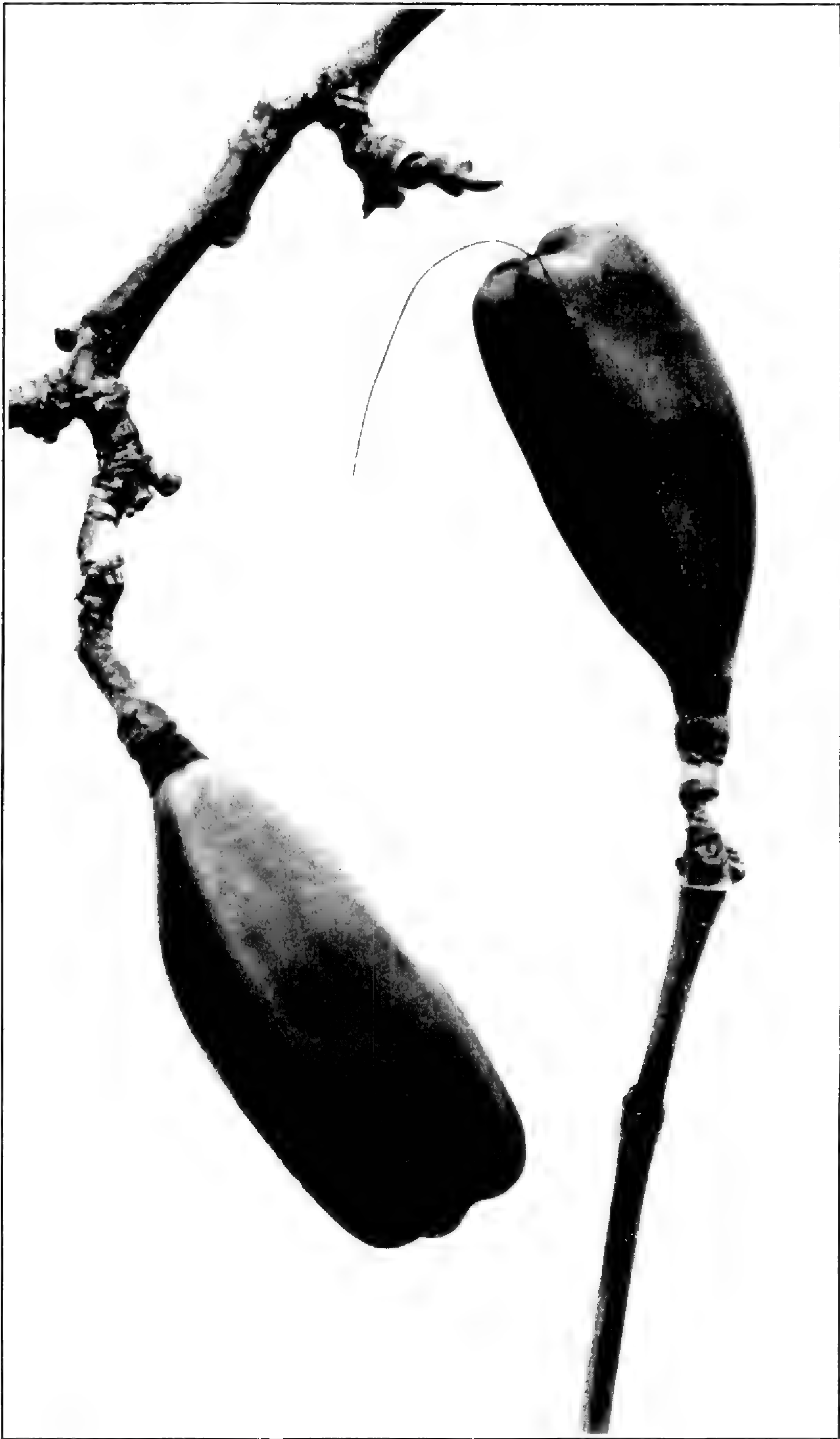
BOMBACOPSIS FENDLERI (SEEM.) PITTIER.



BOMBACOPSIS FENDLERI (SEEM.) PITTIER.



BOMBACOPSIS FENDLERI (SEEM.) PITTIER.



BOMBACOPSIS FENDLERI (SEEM.) PITTIER.



BOMBACOPSIS FENDLERI (SEEM.) PITTIER.

Bombacopsis fendleri (Seem.) Pittier.

PLATES 74-78.

Pachira fendleri Seem. Bot. Voy. Herald 83. 1852-57.*Bombax fendleri* Hemsl. Biol. Centr. Amer. Bot. 1: 124. 1879.

A deciduous tree, very variable in size (height from 6 meters (*Williams* 615) to 30 meters (*Pittier* 2769); diameter of trunk 15 to 40 cm. Trunk and limbs aculeate; terminal branchlets unarmed.

Leaves entirely glabrous, 6 or 7-foliolate. Petioles slender, 4 to 5 cm. long. Petioles 2 to 3 mm. long, canaliculate. Leaflet blades oblong-cuneate, rounded-emarginate at tip, light green above and glaucous beneath, the terminal 9 cm. long, 4.5 cm. broad, the lateral about 4 cm. long and 2 cm. broad. Venation prominent on both sides of the blade; veins straight, connected at their ends. Margin entire.

Flowers loosely paniculate at the end of new branchlets. Pedicels glabrous, articulate, 5 mm. long, provided with 3 rounded, scaly, caducous bractlets about 1.5 mm. long. Calyx tubular, truncate, with irregular, often 5-mucronulate margin, eglandulose, obscurely tomentose, about 8 mm. long and 5 mm. in diameter. Petals inserted around a cuplike disk about 2.5 mm. long, slightly connate at the base, laciniate, reflexed, 8.5 to 10 cm. long, 6 to 9 mm. broad, rounded and often mucronulate at the tip, densely dark-dotted outside except on the covered margin, minutely pubescent and white inside. Staminal tube 2.2 cm. long and 3 to 4 mm. in diameter, softly hairy; filaments slender, white, 4 to 7 cm. long, free from the base, glabrous; anthers oblong-reniform, dorsifixed. Pistil glabrous, about 9 cm. long; ovary subglobose, about 2 mm. long; style slender, ending in a purple, minute, obscurely 5-tipped stigma.

Capsule ovoid, pentagonal and truncate, 6 to 7 cm. long and 4 cm. in diameter, greenish and smooth outside, dehiscent, the valves 1.5 to 2 cm. wide. Seeds small, ovate, smooth, brownish with black dots, wrapped in a silky, pale brown wool.

PANAMA: Chagres, Province of Colón, flowers, March, 1850, *Fendler* 310 (type collection); around Culebra, Canal Zone, flowers, February 14, 1911, *Pittier* 2769; vicinity of Penonomé, flowers and fruits, February-March, 1908, *R. S. Williams* 227, 615; forests of Juan Díaz, near Panama, flowers, January 25, 1911, *Pittier* 2549; cliffs along Caldera River, on road to Boquete, Chiriquí, at an altitude of about 700 meters, flowers and fruits, March 21, 1911, *Pittier* 3310; Agricultural Experiment Station at Matías Hernández, near Old Panama, January, 1915, *Pittier* 6940. (All in U. S. Nat. Herb.)

COSTA RICA: Not recorded, but probably to be found along the Pacific Coast.

EXPLANATION OF PLATES 74-78.—Pl. 74, aculeate trunk, reduced, Panama, *Pittier* 6940. Pl. 75, portion of same, natural size. Pl. 76, floral buds, flowers, stamens, petals, from same individual. Pl. 77, capsules, Punta Patifio, southern Darien, *Pittier*. Pl. 78, open capsule, from same tree. Pls. 76 to 78 natural size.

FLACOURTIACEAE.

A NEW SPECIES OF ZUELANIA AND AN OLD ONE OF ONCOBA.

Zuelania roussoviae¹ Pittier, sp. nov.

PLATE 79.

A deciduous tree, 10 to 25 meters high, the trunk 30 to 50 cm. in diameter at the base. Trunk about 8 meters high; crown rounded. Bark grayish and rugged on the trunk and main limbs, reddish, smooth, and sparsely verruculose on the young twigs.

Leaves on young shoots only. Petioles about 1 cm. long, pilose-pubescent. Leaf blade oblong, rounded at base, subacute, serrulate on the margin, pellucid-dotted, more or less pubescent above, hairy-tomentose beneath, 8 to 10 cm. long, 3 to 3.5 cm. broad. Stipules narrowly lanceolate, acute, about 6 mm. long, hairy, early caducous.

Inflorescence of 10 to 15-flowered clusters, in the defoliate axils at the end of the branchlets. Interpedicellary bracts small, ovate-acuminate, scarious, hairy on the

¹This new species is named for Mrs. H. H. Rousseau, wife of the distinguished naval engineer member of the Panama Canal Commission, an enthusiastic student of tropical orchids.

back. Pedicels 12 to 14 mm. long, hairy. Sepals 5 (3+2), ovate, rounded at tip, 7 mm. long, conchoid, greenish or greenish white, hairy on the back except on the covered margins. Stamens 32 to 34; filaments 3.5 mm. long, glabrous or sparsely hairy; anthers elliptic or ovate-elliptic, nearly 2 mm. long, slightly emarginate at the base, obtuse at the tip, fixed halfway between the base and the middle and versatile. Pseudostaminodes (interspersed with the stamens or perhaps forming an outer circle) 34 to 42, stout, about 2 mm. long, clavate, sparsely covered with long hairs and more or less emarginate at tip. Pistil 3 mm. long, densely hairy except on the stigmatic surface; ovary rounded-ovoid, 1-celled, the numerous pedicellate ovules obpyriform and inserted on 3 parietal placentas; stigma sessile.

Fruit berry-like; peduncle 1.5 to 2 cm. long, hairy, surmounted by the persistent calyx; berry globose, shallowly 3-sulcate, about 3.5 cm. in diameter, yellowish green outside; mesocarp soft, juicy; endocarp like a 3-valved, coriaceous capsule. Seeds numerous, obovoid, angular, about 4 mm. long.

Type in the U. S. National Herbarium, no. 676846, collected on hills between Río Grande and Pedro Vidal, Canal Zone, on the road to Arraiján, altitude about 120 meters, flowers and young fruits, February 11, 1911, by H. Pittier (no. 2710).

PANAMA: (Besides type collection) near Pinogana, southern Darien, fruit, April, 1914 (*Pittier*, photograph); also around Matías Hernández, near Old Panama (*Pittier*).

Specimens of Fendler (no. 318), collected at Chagres, and of S. Hayes, from Paraíso, neither of which I have seen, have been identified with the type of the genus, *Zuelania laetioides* A. Rich., from Cuba and Jamaica. It is more likely, however, that they belong to the new species here described, which differs from the above by the obtuse and versatile anthers and the hairy, clavate pseudostaminodes. From *Z. crenata* Griseb. it is distinguished by the larger flowers and the villous ovary.

The wood of our species, which will be described in another paper, contains an abundant transparent and inodorous resin. At the time of its bloom the bare crowns of this tree are easily detected from far off, as they form white spots on the dark green background of the forest.

EXPLANATION OF PLATE 79.—Leaves and fruit, southern Darien. From the Pittier specimen of April, 1914, after being photographed preserved in alcohol. Natural size.

Oncoba laurina (Presl) Warb. in Engl. & Prantl, Pflanzenfam. 3^{6a}: 19. 1894.

FIGURE 89.

Lindackeria laurina Presl, Rel. Haenk. 2: 89. pl. 65. 1830.

Mayna laurina Benth. Journ. Linn. Soc. Bot. 5: Suppl. 2. 81. 1861.

A tree 12 to 15 meters high, the trunk 30 to 35 cm. in diameter, with radiate branching beginning about 3 meters above the ground, and a pyramidal crown. Bark gray, more or less shaggy. Branchlets striate, smooth.

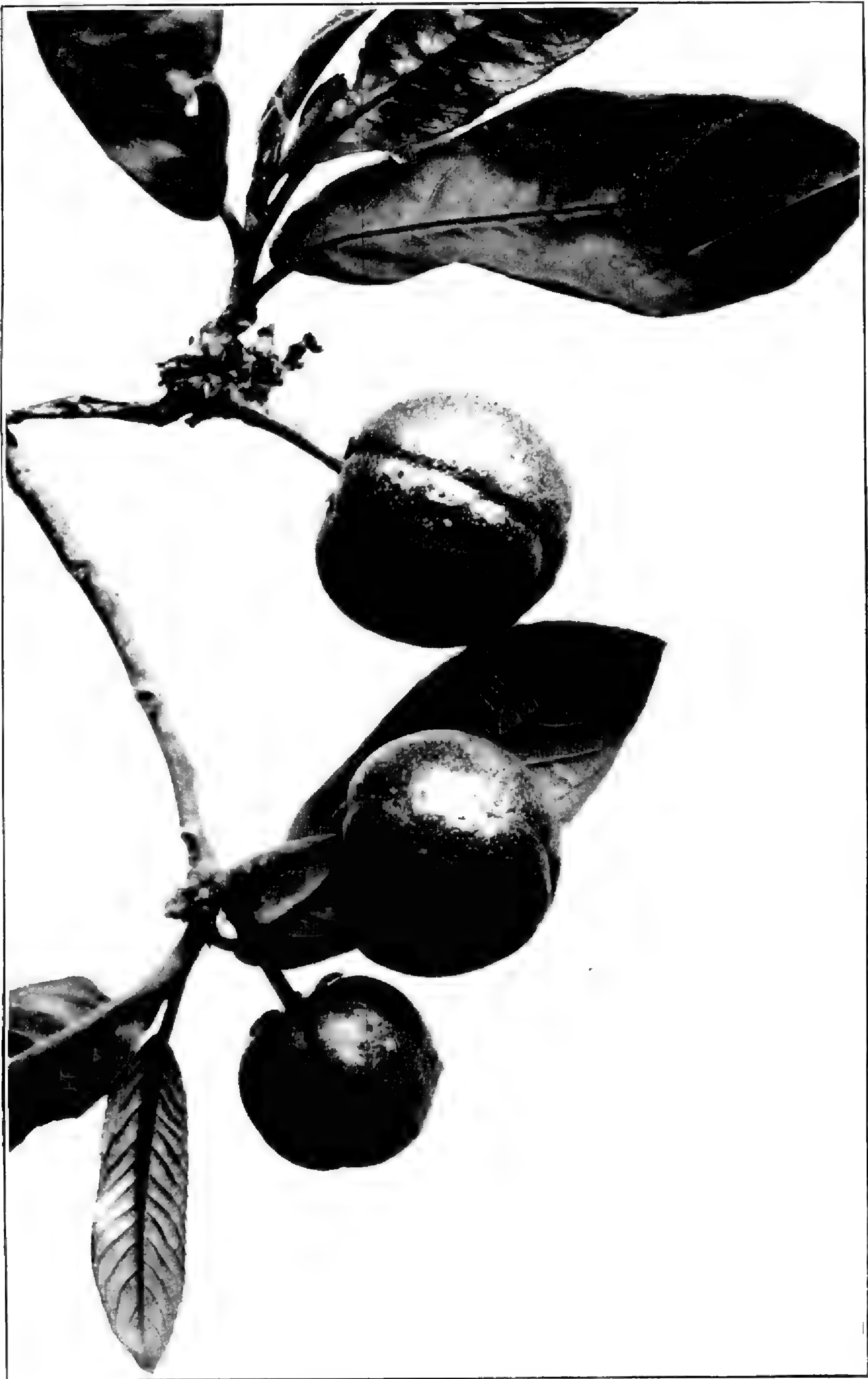
Leaves alternate, petiolate, entirely glabrous, or subpuberulent beneath. Petioles 6 to 9 cm. long, narrowly sulcate, subterete. Leaf blades oblong-lanceolate, 12 to 28 cm. long by 6 to 9.5 cm. broad, subacute at the base, acuminate, olive-green and almost shiny above, paler beneath; nervation little prominent above, more so on the lower face; primary veins distant and anastomosing along the entire margin. Stipules none or early caducous.



FIG. 89.—*Oncoba laurina*.

a, Petal; b, stamens; c, pistil. Scale 3.

Inflorescence terminal, racemose, simple or branched at the base, few-(2 to 10-)flowered, glabrous, shorter than the leaves. Peduncles shorter than the petioles; rachis more or less angulate. Pedicels 0.5 to 1.5 mm. long, slender. Sepals 5, elliptic or ovate-elliptic, 7 mm. long, rounded or subacuminate at tip, subpubescent on the back. Petals 5, narrowly elliptic, about 10 mm. long and 3.5 mm. broad, white. Stamens 28, free or scarcely connate at the base, glabrate, 5.8 mm. long; filaments



ZUELANIA ROUSSOVIAE PITTIER.

3.5 mm. long; anthers 2.8 mm. long, basifix, elliptic-oblong, emarginate at the base, bifid at tip. Pistil about 7 mm. long; ovary softly echinate and pubescent, rounded, 1-celled, the many ovules inserted on 3 parietal placentas; style slender, 6 mm. long, pubescent on its lower half; stigma inconspicuous, obscurely 3-lobulate.

Fruit a rounded, 1-celled, echinate capsule, 3-dehiscent, about 1 cm. in diameter, borne on pedicels about 1.5 cm. long and surmounted by the persistent style, this usually shorter than the bristles, these about 8 mm. long, thick at the base, long-attenuate, hispid. Seeds 1 to 4, ovoid, subangulate, about 4 mm. long.

SOUTH MEXICO: Western coast, *Haenke* (type).

COSTA RICA: Coastal plain of Banana River, fruit, January, 1898, *Pittier*, Inst. Fís. Geogr. Costa Rica, no. 12167; Térraba, fruit, February, 1891, *Tonduz*, Inst. Fís. Geogr. Costa Rica, no. 4000; Mano de Tigre, fruit, April, 1898, *Pittier*, Inst. Fís. Geogr. Costa Rica, no. 12104. (All in U. S. Nat. Herb.).

PANAMA: Vicinity of San Felix, eastern Chiriquí, flowers and fruit, December, 1911, *Pittier* 5228 (U. S. Nat. Herb.); common in Veraguas in forests (*Seemann*)¹; Agua Clara, Trinidad River, Canal Zone, flowers, July 19, 1911, *Pittier*, 3991 (U. S. Nat. Herb.); Panama (*Duchassaing*); railroad station at Gatun, Canal Zone, flowers, December 31, 1860, *Hayes* 15, 18 (U. S. Nat. Herb.).

COLOMBIA: Muzo, around the emerald mines (*Goudot*).² This indication is doubtful.

According to *Seemann*¹ the flowers of this species have never been described, and as only Presl's original description, limited mainly to the leaves and fruits, could be found, it was thought that a complete description had its place here.

SAPOTACEAE.

SPECIES, MOSTLY NEW, OF CHRYSOPHYLLUM, LUCUMA, AND BUMELIA.

Chrysophyllum panamense Pittier, sp. nov.

FIGURE 90.

A medium-sized tree, with rounded crown. Bark grayish, smooth on the trunk, minutely verruculose on the branchlets. Young shoots, leaves, and inflorescences more or less brownish-pubescent.

Leaves rather large, entirely glabrous or more or less pubescent on the petiole, costa, and veins, dark green above and grayish beneath. Petioles 10 to 12 mm. long, deeply canaliculate. Leaf blade elliptic-acuminate, shortly pointed at base, 7 to 21 cm. long, 4 to 8 cm. broad. Costa deeply impressed, the 20 to 24 primary nerves hardly distinct above, both prominent beneath.

Flowers about 5 mm. long, 16 to 30 and more in axillary clusters. Pedicels and calyx silky-pubescent, the former 6 mm. long. Sepals 5 (2+3), broadly ovate, rounded at tip, 1.5 mm. long, thick, and coriaceous. Corolla greenish yellow, about 4.8 mm. long; lobes 5, short (1.2 mm.), pubescent on the outside, with irregularly denticulate margin. Stamens 5; anthers apiculate. Ovary 5-celled, short-pubescent; style about 1 mm. long, smooth, and ending in 5 very short but distinct stigmas.

Fruit not known.

Type in the U. S. National Herbarium, no. 679089, collected along the Sirri River, Trinidad Basin, Province of Colon, Panama, near sea level, flowers, July 20, 1911, by H. Pittier (no. 4005).

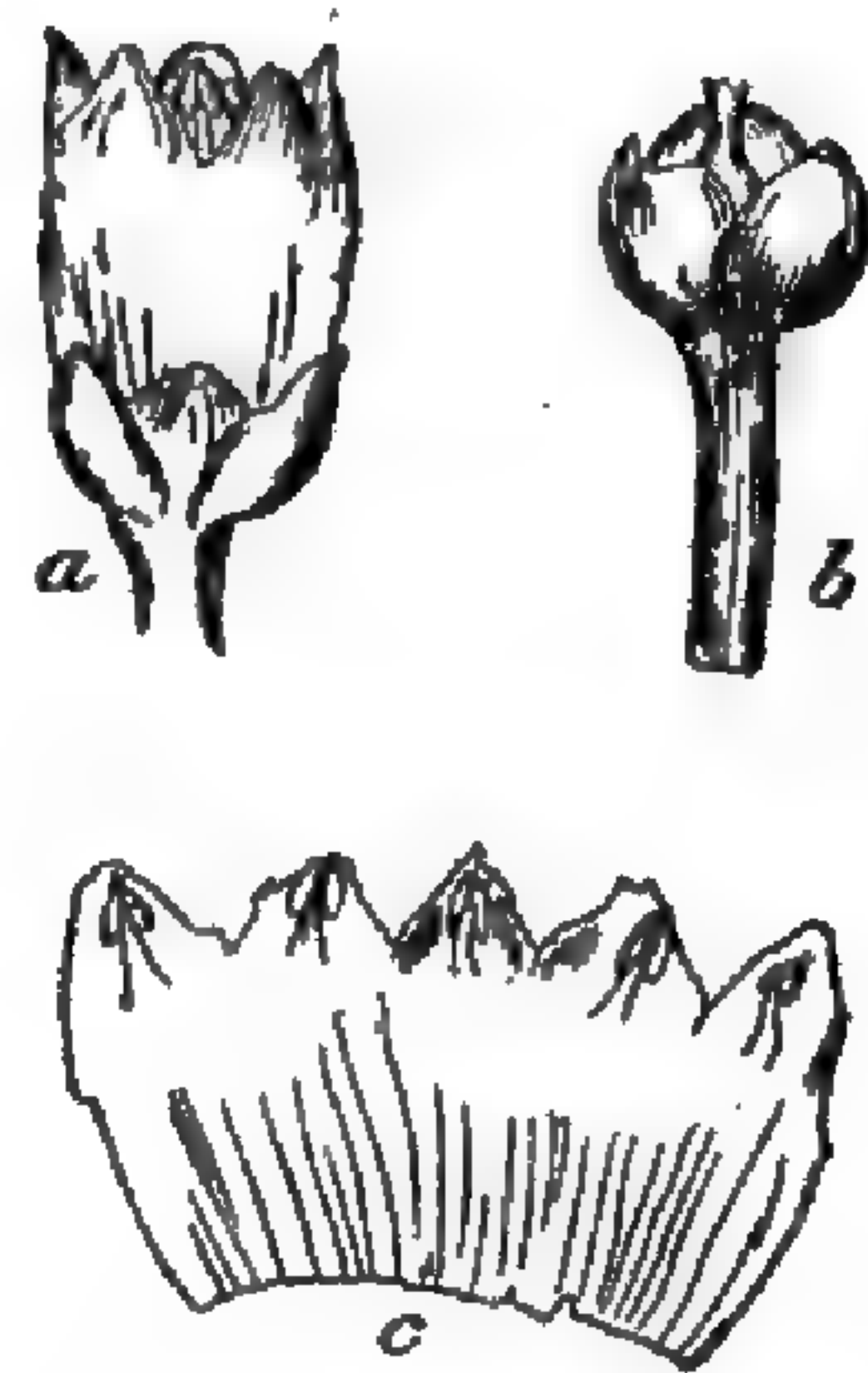


FIG. 90.—*Chrysophyllum panamense*. a, Flower; b, same deprived of the corolla; c, the corolla spread open to show stamens. Scale 3.

¹ Bot. Voy. Herald 79. 1852.

² Triana & Planch. Prodr. Fl. Novogran. 1: 94. 1862.

Lucuma sclerocarpa Pittier, sp. nov.

PLATE 80. FIGURE 91.

Section Macroluma. A large tree, about 25 meters high, lactescent. Trunk usually straight, 30 to 40 cm. in diameter at base; bark smooth, grayish. Young twigs sparsely ferruginous-pubescent, slightly sulcate.

Leaves alternate, petiolate, entire, membranous. Petiole about 1.5 cm. long, rather thick, broadly canaliculate, at first puberulous. Leaf blades ovate-elliptic or elliptic, 10 to 25 cm. long, 4 to 9 cm. broad, rounded and subdecurent at the base, acuminate with a rounded tip, glabrous and pale green above, sparsely villous, lighter and slightly brownish beneath. Nervation pinnate, interreticulate, slightly prominent above, more so beneath, the costa and veins also sparsely hairy beneath; primary veins alternate, 18 to 20 on each side of the costa.

Flowers pedicellate, in clusters of 3 to 6 on the defoliate axils of the last year's growth. Bracts very small, ferruginous-pubescent. Pedicels 1 to 3 mm. long, scarious-pubescent, mostly bearing at the base 2 minute, ovate, clasping bractlets. Sepals 6, free, the 2 exterior ones ovate, half smaller and completely scaly-pubescent outside,

the 4 interior ones also ovate, 5 to 6 mm. long, pubescent outside on the exposed parts only, ciliate on the scarious margin, and silky hairy inside. Corolla about 8 mm. long, glabrous, yellowish white, with a broad tube and 5 irregularly rounded, subtruncate lobes about 3 mm. long. Staminodes alternating with the corolla lobes, free, more or less ovate, subauriculate at the base, narrowing into an irregularly truncate tip. Stamens very short (1.5 to 2 mm. long), glabrous; filaments rather thick and broader at base; anthers basifix, ovate, more or less emarginate or subhastate at the base. Pistil about 7 mm. long; ovary ovoid, 5-celled, densely hairy; style smooth, slightly exserted, more or less distinctly divided at the tip into 5 minute, papillose lobules.

Fruit a sclerous, sessile, ovate, obscurely sulcate berry, attenuate at the base, yellowish and hard at maturity, 7 cm. long and 4.5 cm. in diameter. Seed ovoid, about 4 cm. long and 2.5 cm. in diameter, brown, shiny, the umbilical area very large and extending from one end to the other, the extremity

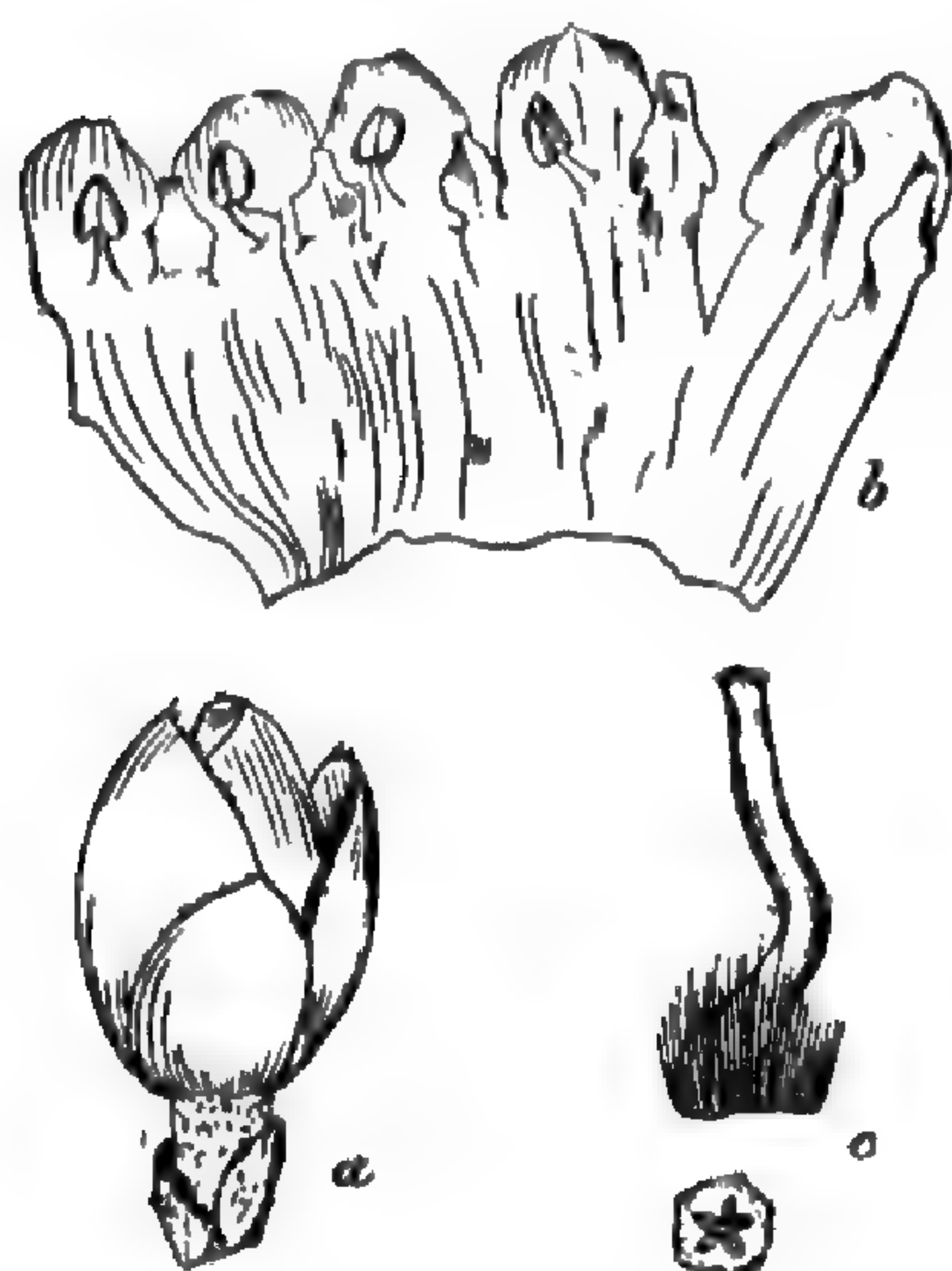


FIG. 91.—*Lucuma sclerocarpa*. a, Floral bud, showing calyx; b, corolla spread open, with stamens and staminodes; c, pistil and cross section of ovary. Scale 3.

of the area opposite the hilum bearing a small, salient, ovate scutellum.

Type in the United States National Herbarium, no. 679508, collected along the Sperdi Creek, near Puerto Obaldía, San Blas Coast, Panama, flowers and fruits, September 3, 1911, by H. Pittier (no. 4357), with photograph of fruit.

This species is a near relative of *Lucuma procera* Mart., with which it has in common the bracteolate pedicels, the sepals hairy inside, and the general characters of the section Rivicoa. But it differs in the shape and size of the leaves, the much shorter filaments of the stamens, and the shape of the staminodes, and probably in its ligneous or coriaceous fruit, a feature not yet signalized, I think, in this genus. It is a subgregarious species, apparently common in the forests of the San Blas Coast.

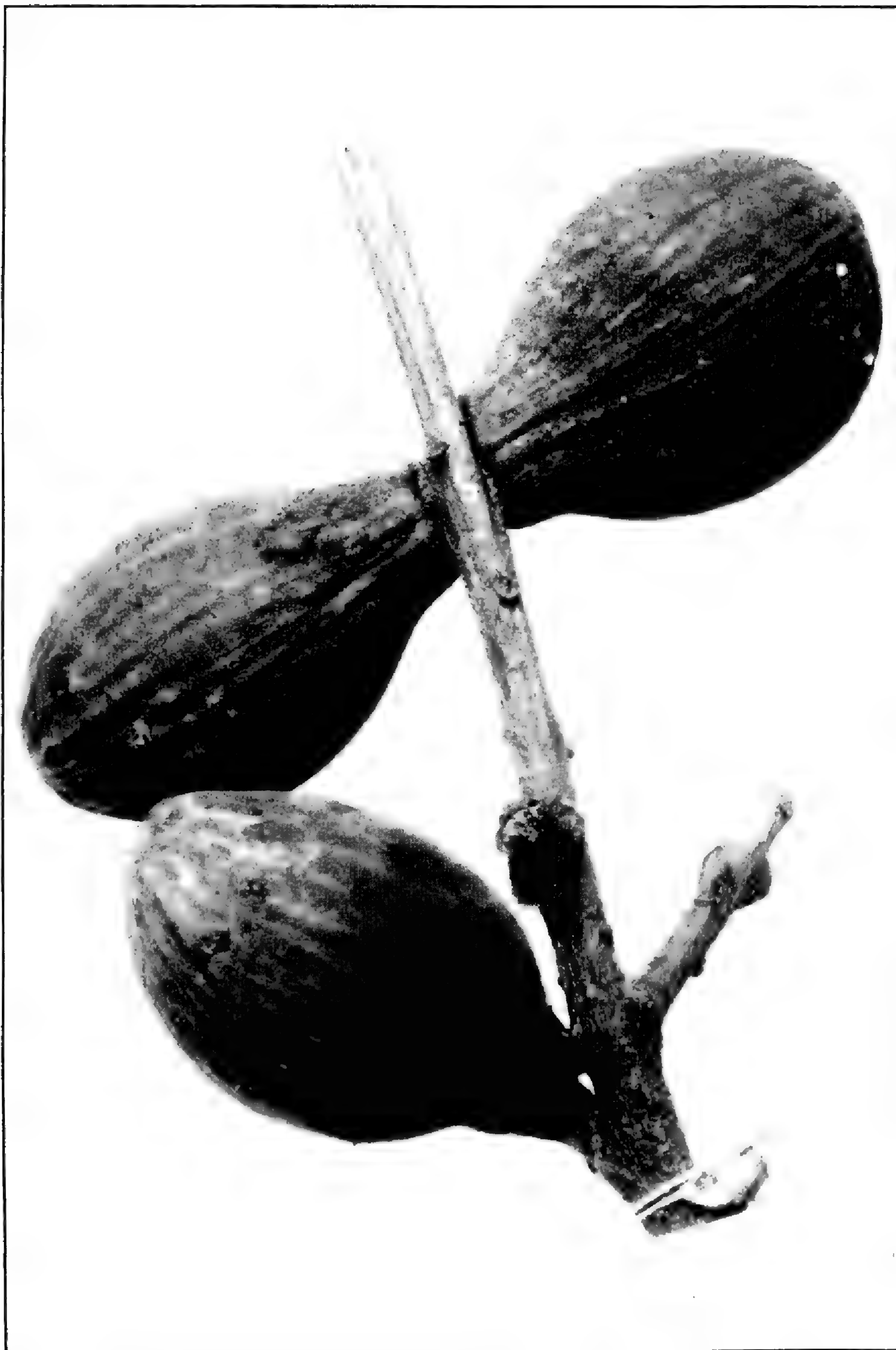
EXPLANATION OF PLATE 80.—Fruits, San Blas Coast, Panama. Material from same tree as floral specimens. Natural size.

Lucuma standleyana Pittier, sp. nov.

FIGURE 92.

Section Guapeba. A small tree, 4 to 5 meters high, with a slender trunk and scanty, diffuse branching. Bark brownish gray, rugose.

Leaves clustered at the ends of the branchlets, oblong, gradually cuneate-attenuate at the base into a broad petiole 6 to 8 mm. long, short-acuminate at the tip, 7 to 20



FRUIT OF LUCUMA SCLEROCARPA PITTIER.

cm. long, 2.5 to 7 cm. broad, smooth and finely reticulate above, grayish velvety with prominent venation beneath; primary veins 15 to 17; margin entire.

Flowers small, subsessile, 1 to 4 in the axils of the leaves or on the defoliate branchlets, provided at the base with about 4 brownish scarious bracteoles. Sepals 4, in alternate valvate pairs, 3 mm. long, ovate, the 2 exterior ones brownish-velvety outside, the interior petaloid. Corolla tubular, 3 mm. long or slightly longer than the calyx, white, glabrous, 4-lobulate, the lobes obtusely rounded. Stamens 4, inserted at the base of the corolla and free, glabrous, about 3 mm. long; filaments rather thick; anthers extrorse, ovate-acuminate, cordate at base. Staminodes 4, inserted in the sinuses of the lobules, about 0.7 mm. long, acute at the tip. Pistil about 2 mm. long; ovary subspherical, 4-celled, surrounded by long straight hairs; style smooth, rounded at tip.

Young fruits pomiform, villous; mature fruit not known.

Type in the U. S. National Herbarium, no. 678879, collected on Mamei Hill, Canal Zone, Panama, near the top, about 80 meters above sea level, flowers, July 6, 1911, by H. Pittier (no. 3807).

This species seems to be closely allied to *Lucuma glomerata* Miquel, having in common the low-inserted stamens and the silvery indument of the lower face of the leaves, but differing by the number of the primary veins and by the flowers being slightly larger, the margin of the sepals and lobules of the corolla smooth, and the latter more coherent and covering the narrower staminodes.

***Lucuma sambuensis* Pittier, sp. nov.**

A small, lactescent tree, about 10 meters high, the trunk 35 cm. in diameter at the base. Crown pyramidal, with radiate branching. Bark reddish gray, smooth. Young twigs sulcate, glabrous.

Leaves alternate or in whorls at the end of the young twigs, petiolate, entirely glabrous. Petiole thick, 1 to 1.5 cm. long, broadly canaliculate. Leaf blades obovate or oblanceolate, cuneate at the base, acuminate at tip, 20 to 25 cm. long, 5 to 9 cm. broad, light green above, paler beneath. Midvein salient on both faces, more so beneath; primary veins strongly arcuate, 13 to 15 on each side, subimpressed on the upper face, very salient on the lower one; margin quite entire.

Flowers not known.

Fruit ovoid, sessile or subsessile, fleshy, very lactescent, 5.5 cm. long, 4 cm. in diameter, densely pilose-pubescent, and obscurely sulcate from base to top.

Type in the U. S. National Herbarium, no. 715896, collected on the foothills of the Garagará Mountains, in the Sambú Valley, southern Darien, Panama, fruit, February 7, 1912, by H. Pittier (no. 5621).

This species does not answer to the description of any of those known, but belongs very likely to the section *Macroluma*, together with *L. sclerocarpa*. In the absence of the flowers its status can not be definitely settled.

***Bumelia obovata* A. DC. in DC. Prodr. 8: 191. 1844.**

FIGURE 93.

A small tree, up to 6 meters high, the trunk seldom over 20 cm. in diameter, branched from close to the base. Bark more or less scaly, brownish gray. Branchlets usually ending in an elongate, conical thorn.

Leaves small, deciduous, glabrous, 2 to 6-clustered (in the first stage) or single. Petiole about 8 mm. long. Leaf blades obovate, cuneate at the base, rounded or emarginate at tip, olive-green and shiny above, pale beneath, when mature about 4

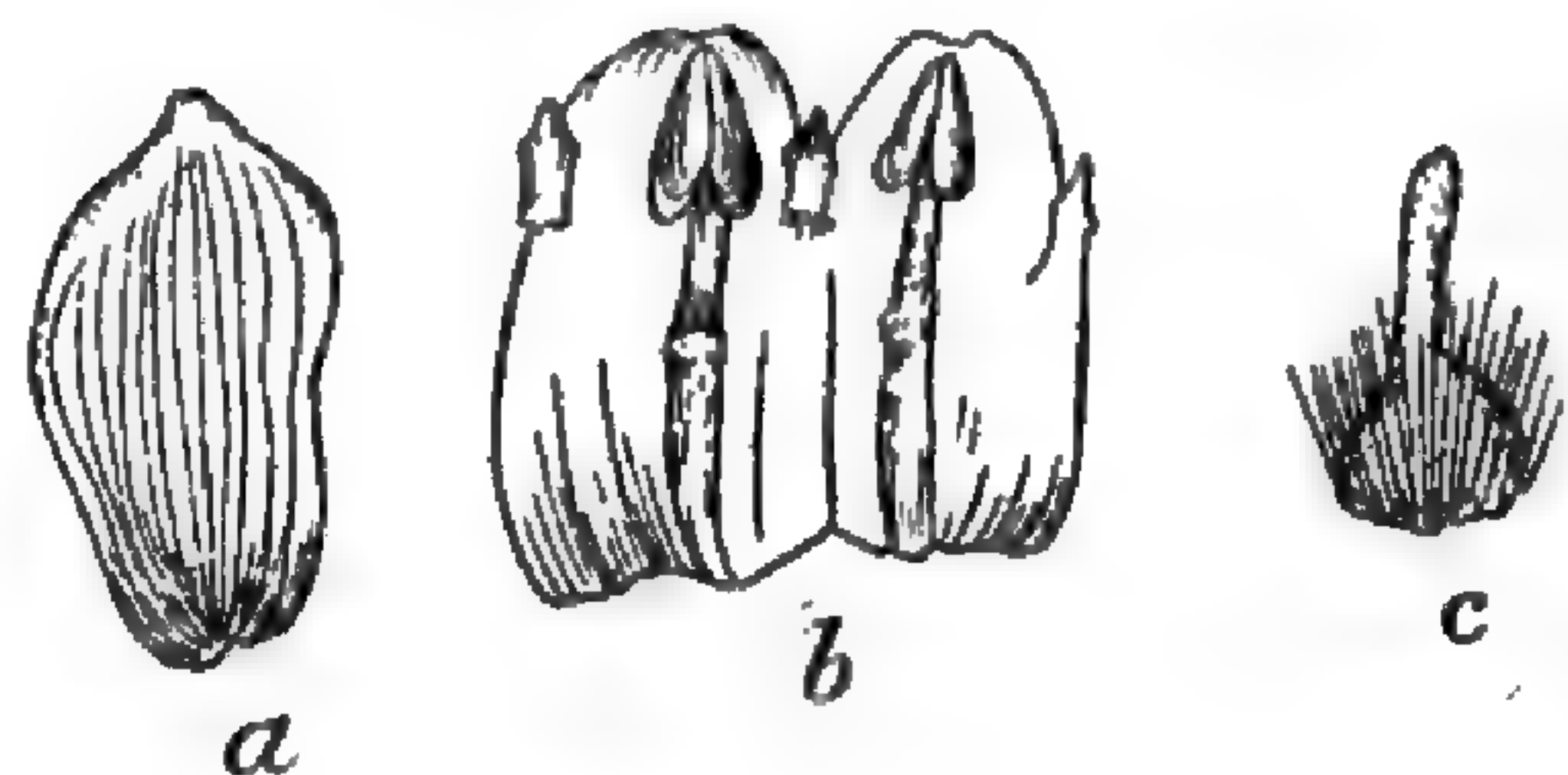


FIG. 92.—*Lucuma standleyana*. a, Sepal; b, part of corolla, showing also stamens and staminodes; c, pistil. Scale 6.

cm. long and 2 cm. broad. Costa subimpressed above, salient beneath, the fine primary veins forming with it an angle of about 40° .

Flowers entirely glabrous, in clusters of 2 to 8 on the foliar nodes. Pedicels 3 to 6.5 mm. long. Sepals 5, ovate, 2 to 2.5 mm. long, persistent. Corolla white, about

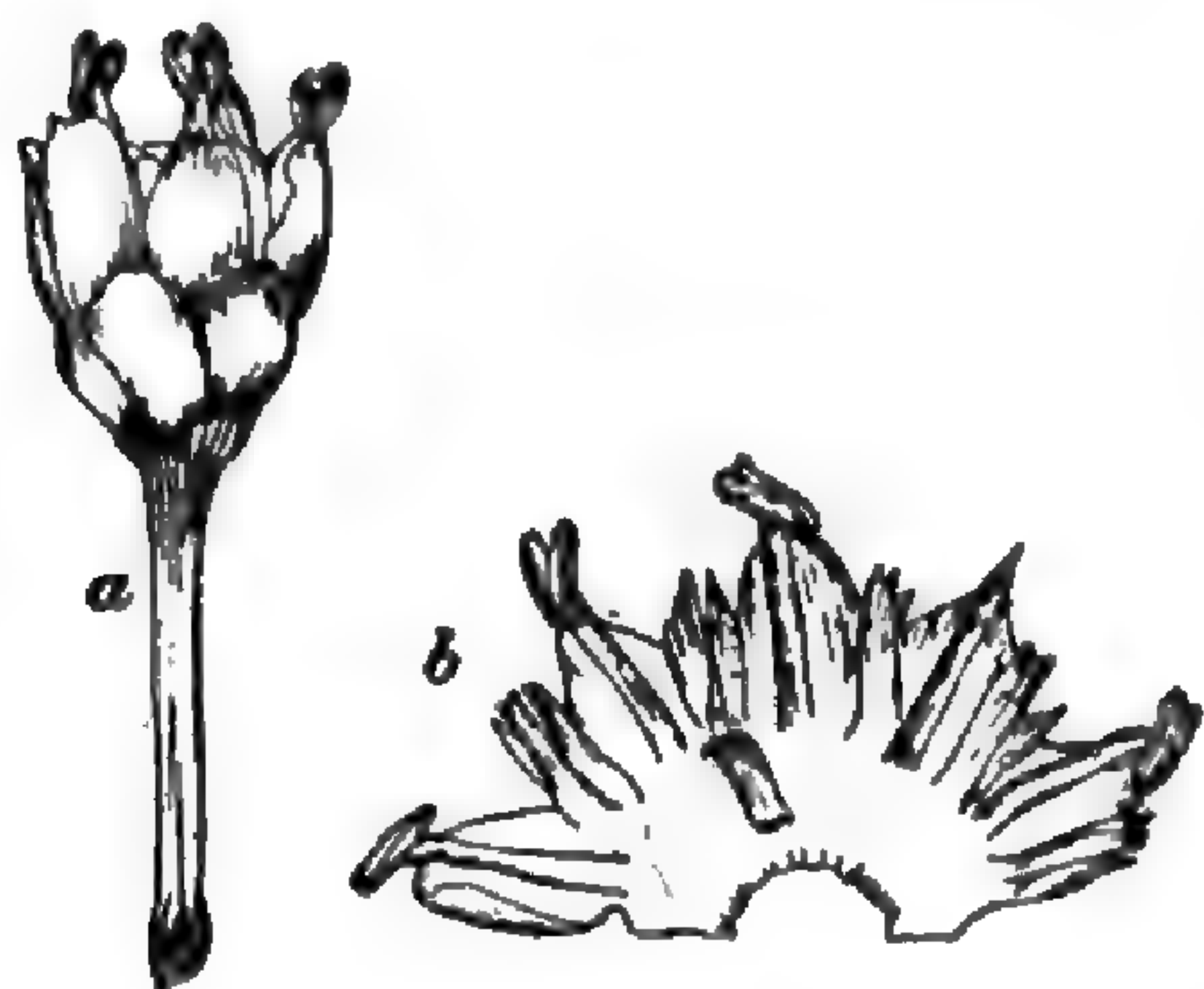


FIG. 93.—*Bumelia obovata*. *a*, Flower; *b*, spread corolla. Scale 3.

4.2 mm. long, deeply cleft; exterior lobes 5, oblong, with smooth margin; interior lobes 10, lanceolate, acute or bicuspidate, little shorter than the exterior ones, each pair inserted in the sinuses between these. Stamens 5, inserted in the middle of the tube; anthers ovate-lanceolate, dorsifix, exserted. Staminodes nearly as long as the exterior lobes of the corolla, ovate, rounded at tip, with a slightly denticulate margin. Pistil 3.5 mm. long; ovary smooth, globose, 5-celled, glabrous but with a crown of stiff hairs at the base; style slender, glabrous, persistent, ending in a minute papillose stigma.

Fruit an ovoid, 1-seeded berry, with thin pulp. Seed ovoid, brown and shiny outside, with the small umbilical area near the apex.

PANAMA: Aguadulce, along the outskirts of the tidal belt, flowers, December 5, 1911, Pittier 4988 (U. S. Nat. Herb.).

SYMPLOCACEAE.

A NEW SPECIES OF SYMPLOCOS.

Symplocos chiriquensis Pittier, sp. nov.

FIGURES 94, 95.

Section Eusymplocos, subsection Ciponimastrum. A tree up to 30 meters high. Trunk straight, 50 cm. in diameter or less; bark grayish. Floriferous branchlets with purplish green, quite smooth, bark.

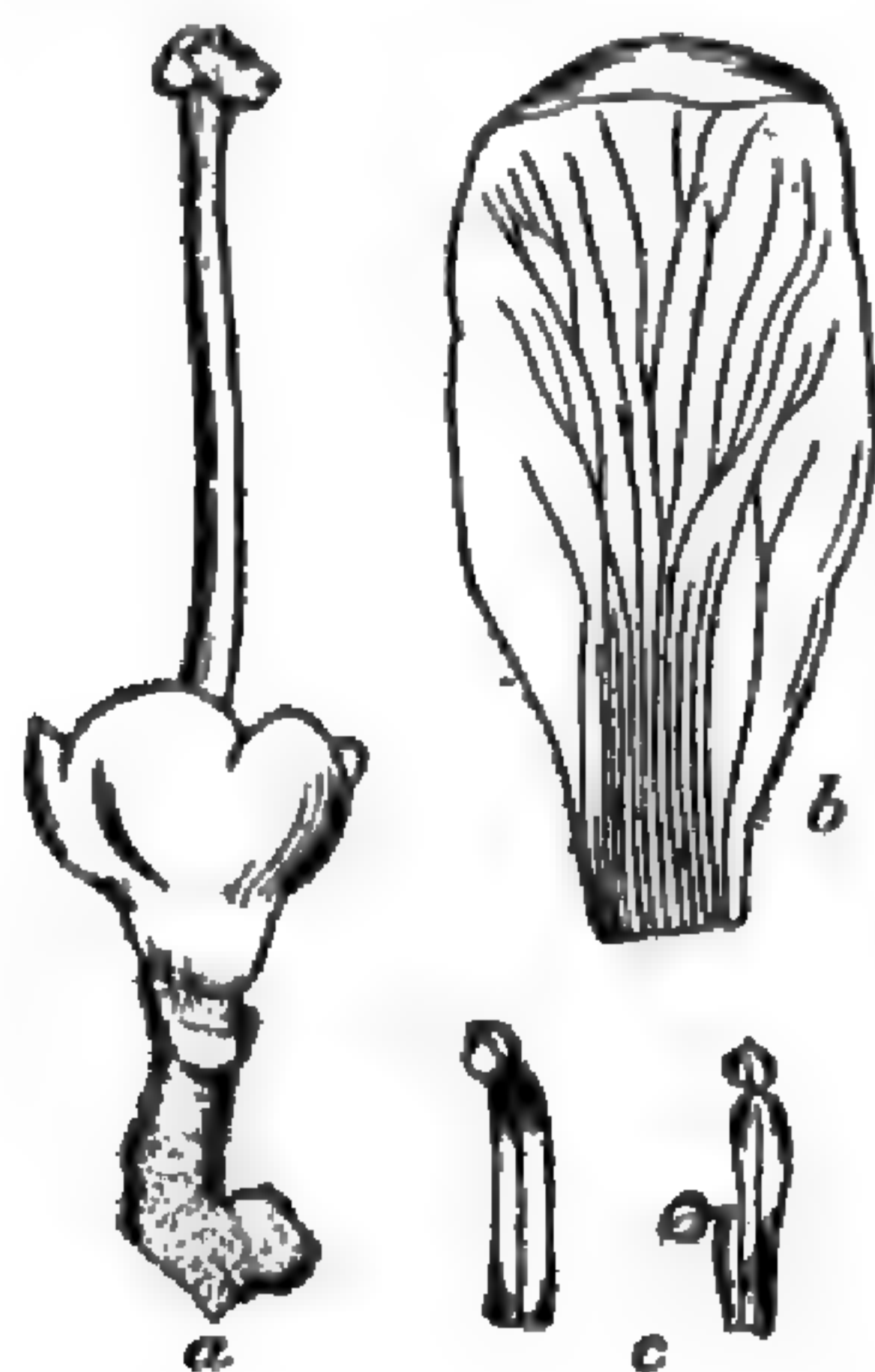


FIG. 94.—*Symplocos chiriquensis*. *a*, Calyx and style; *b*, petal; *c*, stamen. Scale 3.

Leaves only on new growth at ends of branchlets, alternate, petiolate, entirely glabrous (though covered with gray hair in young buds). Petioles 7 to 10 mm. long, canaliculate, subdecurrent on the branchlets. Blades membranous, 5 to 10 cm. long, 2.5 to 3.5 cm. broad, elliptic, cuneate at base, more or less rounded-acuminate at tip, almost shiny above, a shade paler and with prominent venation beneath; margin crenate, subrevolute.

Inflorescences axillary on the young branchlets. Racemes 1 to 5-flowered, 2 to 4 times as long as the petioles;



FIG. 95.—*Symplocos chiriquensis*. Bractlet. Scale about 20.

rachis minutely hairy. Flowers odorous. Pedicels 0 to 1.5 mm. long. Calyx campanulate, 4 or 5-lobate, surrounded at base by 3 to 5 very caducous, deltoid, apiculate bractlets, about 1 mm. long and pilose-ciliate on the margin; calyx lobes broadly rounded, ciliate on the margin. Corolla pink, 10 mm. long, the tube equal in length to the calyx lobes, the 5 petals obovate-oblong, 4 to 5 mm. broad, more or less ciliate toward the base and apparently not reflexed. Stamens numerous (about 35), 3-seriate, free at the upper part, included, but the longest not much shorter than the corolla; free part of the filaments flattened, finely apiculate at the tip; anthers

cordate. Ovary silky-hairy, 4 or 5-celled, each cell 2-ovulate; style slender, about 7 mm. long, slightly hairy at the base, smooth above; stigma capitellate, obscurely multilobulate and papillose.

Fruits not known.

Type in the U. S. National Herbarium, no. 677388, collected in forest along the Caldera River near El Boquete, Chiriquí, Panama, at an altitude of about 1,100 meters, flowers, March 4, 1911, by H. Pittier (No. 2994).

Very likely the same species which was collected in Veraguas by Seemann and cited in his *Flora of Panama*¹ as *Symplocos martinicensis* Jacq. No mention of this locality is made in Hemsley's *Biologia Centrali-Americana* and Brand, the monographer of the family Symplocaceae in the *Pflanzenreich*, does not seem to have seen Seemann's specimens. Our tree differs from *S. martinicensis* by its smaller leaves, its peculiar ciliate-apiculate bractlets, the more broadly rounded calyx lobes, and the rather dense silky-hairy pubescence of the ovary.

VERBENACEAE.

NEW SPECIES OF CITHAREXYLUM AND VITEX AND AN OLD ONE OF VITEX.

Citharexylum macranthum Pittier, sp. nov.

A forest tree, 25 to 30 meters high, the trunk up to 50 cm. in diameter at the base. Trunk straight, covered with a reddish rugose bark. Crown elongate; limbs slightly ascending. Terminal branchlets 4 or 6-angled, thick, glabrous, more or less fistulose.

Leaves thin, petiolate, entirely glabrous, usually alternate but often ternate at the end of the younger, floriferous shoots. Petioles 1.5 to 3 cm. long, more or less broadly sulcate. Leaf blades ovate to elliptic, 10 to 24 cm. long, 6 to 9 cm. broad, more or less rounded-attenuate and provided with two large glands at the base, subacute or rounded at tip, smooth above, finely reticulate between the salient veins beneath; margin entire.

Inflorescence subterminal with the racemes axillary, usually ternate, on the 2 or 3 upper nodes of the branchlets. Rachis slender, glabrous or minutely hirsute, 12 to 25 cm. long. Flowers distinctly zygomorphous and large for the genus (about 17 mm. long). Pedicels very short (not over 0.5 mm. long), minutely hirtellous. Calyx 5 mm. long, salver-shaped, irregularly 5-toothed, subglabrous or finely pubescent. Corolla 15.5 to 17 mm. long, white, glabrous; tube broad, cylindrical, slightly arcuate, about 11 mm. long; lobes 5, well developed, the median one irregularly rounded-acuminate with a narrow claw, the lateral ones elongate, conchiform and obtusely pointed at tip. Stamens included, inserted below the middle of the tube, entirely glabrous; filaments slender; anthers elliptic, emarginate at base, rounded at tip. Pistil entirely glabrous, 4 mm. long; ovary ovoid, 4-celled, each cell 1-ovulate; style 1 to 1.5 mm. long; stigma capitellate, subbilobate, papillose on the surface.

Fruit not known.

Type in U. S. National Herbarium, nos. 678974 and 679301, collected along Río Fató, above Nombre de Dios, Province of Colón, Panama, in high forest, flowers, July 8 and August 16, 1911, by H. Pittier (nos. 3897 and 4199).

This tree departs from all hitherto described species of the genus by the ternate leaves and racemes of the floral branchlets, the unusually large corollas, the stamens inserted well in the lower half of the corolla tube, and the very short pistil. It shares with *C. macradenium* Greenm., the peculiarity of having very large glands at the base of the leaf blade. The core of the trunk is of a dirty yellow color. The wood is hard, but tough, and little used. The tree is called "iguanero" by the natives.

¹ Bot. Voy. Herald. 166. 1854.

Vitex masoniana Pittier, sp. nov.

FIGURE 96.

Section Limia. A tree about 25 meters high, with a straight trunk and grayish-white bark, longitudinally rimose. Limbs ascending; crown elongate. Young foliferous and floriferous shoots tetragonous and subsulcate, covered with a dense yellowish-brown pubescence.

Leaves developed at time of flowering, 5-foliolate. Petioles brownish-puberulous, 5.5 to 6 cm. long, broadly canaliculate; petiolules brownish-pubescent, 2 to 6 mm.

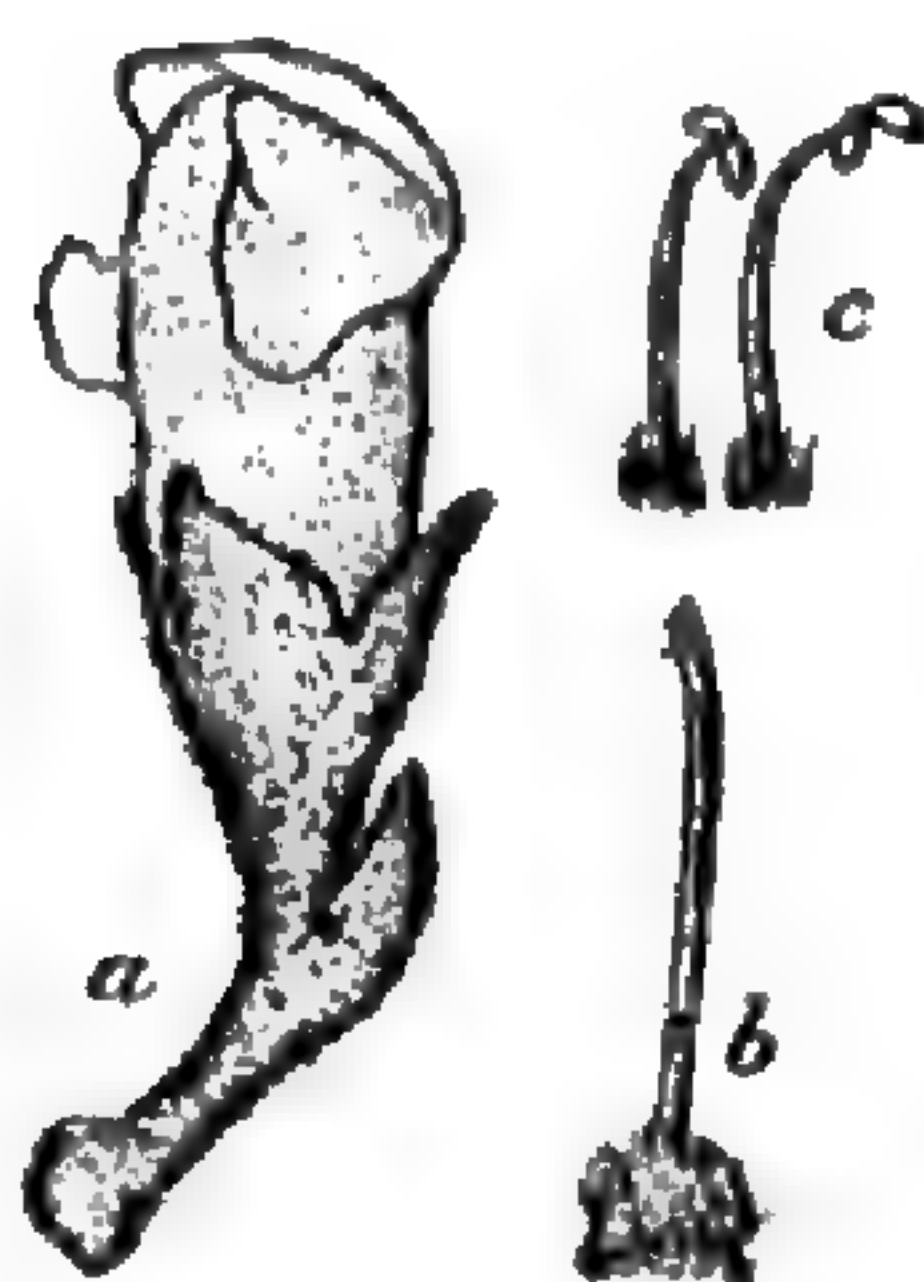


FIG. 96.—*Vitex masoniana*.
a, Floral bud, showing calyx; b, pistil; c, stamens. Scale 3.

long, the exterior ones being shortest and the middle one longest; leaflets elliptic-lanceolate, acute at both ends, glabrous and almost shiny, with the venation deeply impressed above, brownish hairy tomentose with the venation strongly prominent beneath; margins entire, revolute; middle leaflet blade 15 to 20 cm. long, 3.5 to 4 cm. broad; lateral leaflets 8 to 10 cm. long, 3 cm. broad.

Cymes paniculate, the rachis densely brownish-pubescent. Panicles about 15 cm. long, its branchlets opposite or subopposite. Peduncles 5 cm. long; middle flower of the terminal cymes sessile, or almost so, the pedicels of the lateral flowers 2 to 3 mm. long. Bractlet ovate-lanceolate, obtuse, hairy, 2 mm. long. Calyx campanulate, deeply 5- (or 4-) toothed, hairy outside, about 3.5 mm. long; teeth acute-triangular, 1.5 to 2 mm. long, the intervening sinuses rounded at apex. Corolla lilac-colored, densely puberulous outside, except at base of tube, hairy inside at the insertion of the stamens and barbate at the base of the inferior lobe; tube short (about 3 mm.) and broad; inferior lobe suborbicular (4 mm. broad, 3.5 mm. long, with a narrow claw); lateral lobes shorter, ovate-rounded, the upper lobes smallest, triangular and subacute. Stamens exserted, 2 to 3 mm. long; filaments thick, long-hairy; anther cells ovoid-oblong, diverging. Ovary globose-depressed, hairy; style 4.5 mm. long, smooth, shortly bifid at tip.

Berry globose-depressed, puberulous, surrounded by the enlarged calyx.

Type in the U. S. National Herbarium, no. 679649, collected in the forests of Gas-pasabana, upper Mamoni Valley, above Chepo, Province of Panama, Panama, at an altitude of about 200 meters, flowers and fruits, October 6, 1911, by H. Pittier (no. 4489).

This species seems to have its nearest affinities with *Vitex multiflora* Miquel. The leaves, however, are 5-foliolate, the calyx distinctly 5-toothed, and the corolla quite distinct. Named in honor of Lieut. Col. Chas. F. Mason, chief health officer of the Canal Zone.

Vitex floridula Duchass. & Walp. Ann. Bot. Syst. Walp. 3: 240. 1852.

A tree of medium size, with a straight trunk, covered with grayish, longitudinally rimose bark. Branchlets more or less puberulous at first, later subglabrate.

Leaves undeveloped at the time of flowering, 3-foliolate with the lateral leaflets easily caducous, pubescent and turning black through desiccation when young, quite smooth, coriaceous and paler beneath at maturity. Petioles slender, 3 to 4.5 cm. long. Middle leaflet much larger than the lateral ones, 5 to 13 cm. long, 3 to 6 cm. broad, its petiolule 7 to 13 mm. long, the blade ovate-elliptic, ovate, or obovate, subacute at the base, acute, rounded, or emarginate at the tip, the margin entire and revolute. Petiolules of the lateral leaflets 4 to 7 mm. long, the blades 4 to 7 cm. long, 2 to 4 cm. broad, elliptic-acute or ovate and more or less rounded at tip.

Cymes axillary, shorter than the petioles of the mature leaves, 3 or 4 times divided. Rachis finely pubescent. Pedicels 1 to 3 mm. long, the middle one shortest. Bractlet linear, obtuse, 1.5 mm. long, hairy, deciduous. Calyx pubescent outside, smooth inside, cupuliform, subtruncate, with 5 irregular teeth, about 3 mm. long. Corolla

subbilabiate, bluish purple, hairy outside except at base of tube; tube about 5 mm. long, narrow at base and ventricose; lobes hairy on the exposed upper side, the inferior one larger, orbicular, with barely a few long hairs at the base, the lateral and superior ones almost even, obovate-rounded. Stamens long-exserted; filaments slender, flattened, barbate at the base, respectively 5.5 and 6.5 mm. long; anther cells egg-shaped. Ovary globose, quite smooth; style up to 9 mm. long, smooth.

Berry egg-shaped, about 14 mm. long and 10 mm. in diameter, bluish black.

PANAMA: Isthmus of Panama, *Duchassaing* (type); forests on dry limestone hills around Alhajuela, Chagres Valley, flowers and fruit, May 13, 1911, *Pittier* 3477 (U. S. Nat. Herb.); Hospital Grounds at Ancon, Canal Zone, flowers, February, 1911, *Chas. F. Mason* 10 (U. S. Nat. Herb.); Empire, Canal Zone, flowers, March 16, 1912, *Christopherson* 153 (U. S. Nat. Herb.); Sabana de Juan Corso, near Chepo, Province of Panama, mature leaves only, October, 1911, *Pittier* 4683 (U. S. Nat. Herb.).

Although the specimens do not absolutely agree, especially with reference to the calyx, with the original description of *Duchassaing* and *Walpers*, I do not hesitate to identify them with their *Vitex floridula*. This is the species of common occurrence in the district explored by *Duchassaing* and the only one known which has close affinities with *V. divaricata* Swartz.

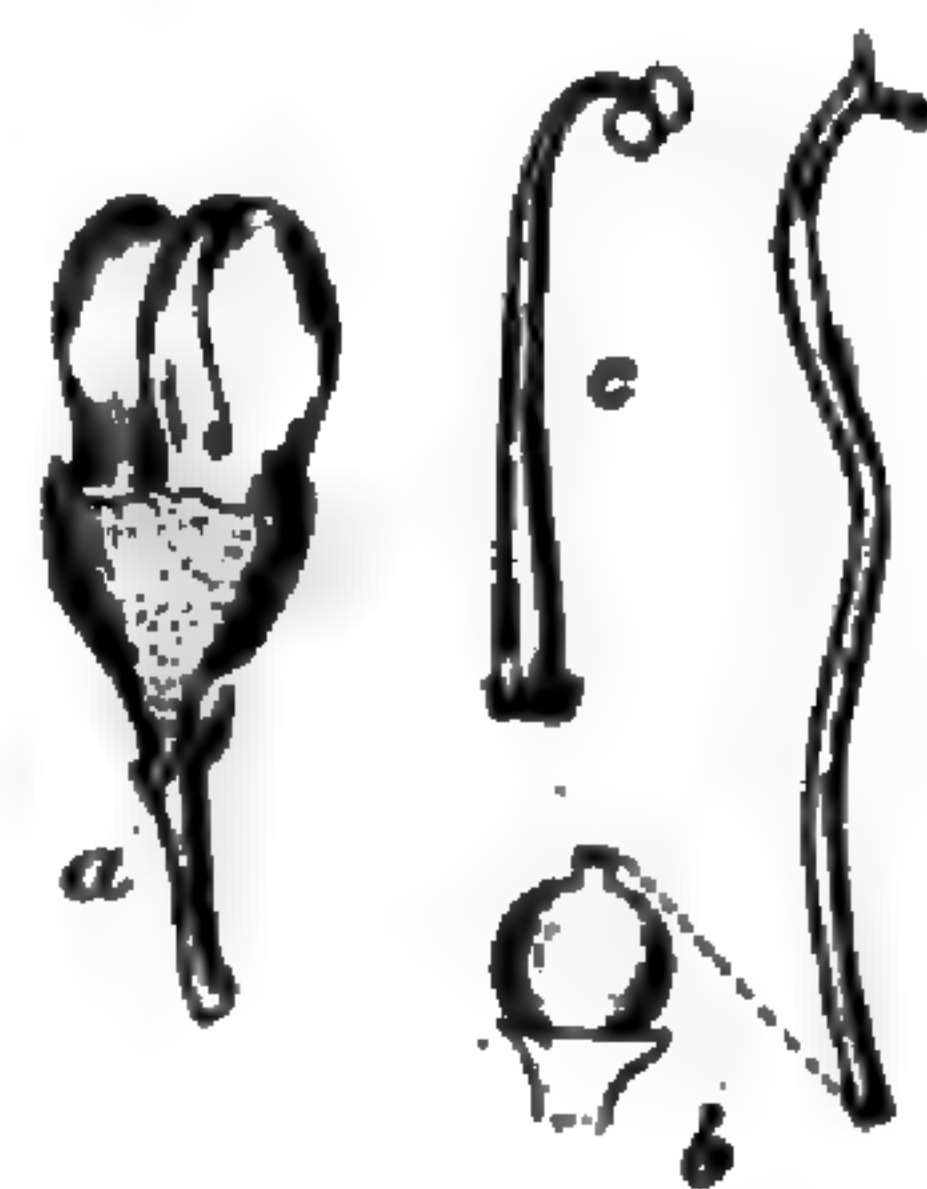


FIG. 97.—*Vitex floridula*. a, Floral bud, showing calyx; b, pistil; c, stamen. Scale 3.

INDEX.

[Synonyms in *italic*. Page numbers of principal entries in heavy-face type.]

	Page.		Page.
Amblyanthera (section).....	143, 144	Hermesias.....	145, 146, 156
Amherstieae (tribe).....	148	Heterostemon.....	148, 149
Arizá.....	152	Iguanero.....	169
Bogamani.....	144	Limia (section).....	170
Bogobane.....	144	Lindackeria laurina.....	164
Bombacaceae.....	143, 161	Lucuma glomerata.....	167
Bombacopsis.....	161, 162	procera.....	166
fendleri.....	163	sambuensis.....	167
sessilis.....	162	sclerocarpa.....	168
Bombax.....	159, 160	standleyana.....	166
barrigon.....	159, 160, 161	Macho.....	154
fendleri.....	163	Macrolobium.....	148, 149
sessile.....	161	Macroluma (section).....	166
Brownea.....	145, 147, 148, 149	Mayna laurina.....	164
ariza.....	146, 147, 148, 150, 151, 152	Multijugatae (section).....	148
arocensis.....	146, 152	Oncoba laurina.....	164
birschellii.....	146	Pachira.....	159, 160
capitella.....	146, 153	aquatica.....	160, 161
cauliflora.....	146, 147, 155	fendleri.....	161, 163
coccinea.....	146, 147, 153, 154, 156	insignis.....	160
grandiceps.....	146, 148, 150, 151	macrocarpa.....	160
guaraba.....	146, 152	sessilis.....	161, 162
guyanensis.....	146, 147	villosula.....	161
latifolia.....	146, 147, 156	Palo de cruz.....	150
leucantha.....	146	de sangre.....	147
macrophylla.....	146, 148, 149, 152, 154, 155	Palovea.....	148, 149
neglecta.....	146, 147	Rosa.....	154, 156
negrensis.....	146, 147, 156	de montaña.....	150
racemosa.....	147, 153	del monte.....	156
rosa.....	147, 156	guaraba.....	152
rosa-del-monte.....	146, 147, 155, 156	macho.....	152
rosa-montis.....	156	Roso.....	154
speciosa.....	146, 147, 154	Salacia blepharodes.....	159
Browneopsis.....	147, 148, 149	Symplocos chiriquensis.....	168
cauliflora.....	148	martinicensis.....	169
excelsa.....	148, 149, 157	Tachigalia.....	148
ucayalina.....	148	Tapirira chagrensis.....	158
Bumelia obovata.....	167	guyanensis.....	158
Caesalpinaceae.....	143, 148	myriantha.....	157
Chrysophyllum panamense.....	165	Virola.....	144
Ciponimastrum (subsection).....	168	carinata.....	144
Citharexylum macradenium.....	169	panamensis.....	144
macranthum.....	169	venosa.....	144
Componeura.....	145	warburgii.....	143
costaricensis.....	144	Vitex divaricata.....	171
sprucei.....	145	floridula.....	170, 171
Elizabetha.....	148, 149	masoniana.....	170
Eperua.....	149	multiflora.....	170
Eusymplocos (section).....	168	Zuelania crenata.....	164
Eutapirira (section).....	158	laetioides.....	164
Goniorrhachis.....	148	roussoviae.....	163
Guapeba (section).....	166		

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VOLUME 18, PART 5

PRELIMINARY REVISION OF THE
GENUS INGA

By HENRY PITTIER



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BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

ISSUED OCTOBER 30, 1916

PREFACE.

In identifying recent Panama material of *Inga*, a very large American genus of leguminous trees, Mr. Henry Pittier, of the Bureau of Plant Industry, United States Department of Agriculture, has found it necessary to undertake a critical review of all the species of the genus. No general treatment of *Inga* has appeared since Bentham's extensive monograph in 1875, although many species have been described since that year. For several reasons a conclusive revision of the genus is impracticable at the present time. Many of Mr. Pittier's conclusions, however, are embodied in the accompanying paper, which consists chiefly of critical observations upon the characters and status of some of the older species, notes on their arrangement in a natural classification, and descriptions of new species as represented by specimens in several of the larger American herbaria. There is given, in conclusion, a list of all the species deemed valid, with an indication of those lacking in the American herbaria consulted.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

CONTENTS.

	Page.
Introduction.....	173
Systematic treatment.....	174
Section 1. Leptinga.....	174
New species.....	174
Notes on critical species.....	177
Section 2. Diadema.....	178
New species.....	178
Two species published as one.....	179
Species transferred to or from Diadema.....	181
Section 3. Bourgonia.....	181
Critical notes on several species.....	181
Section 4. Pseudinga.....	182
Series 1. Glabriflorae.....	182
Series 2. Gymnopodae.....	183
New species.....	183
Notes on critical species.....	187
Series 3. Pilosiusculae.....	188
New species.....	188
Critical notes.....	193
Series 4. Leptanthae.....	195
Notes.....	195
Series 5. Longiflorae.....	195
Critical notes.....	195
Series 6. Calocephalae.....	198
New species.....	198
Descriptions of two old species with notes.....	199
Series 7. Vulpinae.....	201
New species.....	201
Series 8. Dysanthae.....	204
A new species.....	204
Section 5. Euinga.....	205
Series 1. Tetragonae.....	205
Descriptions of old and new species.....	205
Series 2. Sulcatae.....	210
Descriptions of new and old species.....	210
Notes on old species with descriptions of new subspecies.....	216
Group of <i>Inga vera</i>	216
Group of <i>Inga edulis</i>	217
Group of <i>Inga spuria</i>	217
List of the known species of <i>Inga</i>	218
Index.....	IX

ILLUSTRATIONS.

PLATES.

	Facing page.
PLATE 81. <i>Inga maxoniana</i> Pittier.....	174
82. Fruit of <i>Inga roussoviana</i> Pittier.....	176
83. <i>Inga portobellensis</i> Beurling.....	178
84. Fruit of <i>Inga portobellensis</i> Beurling.....	178
85. <i>Inga myriantha</i> Poepp. & Endl.....	178
86. <i>Inga sertulifera</i> DC.....	178
87. <i>Inga umbellifera</i> Steud.....	178
88. Fruit of <i>Inga paterno</i> Harms.....	180
89. Fruit of <i>Inga aestuariorum</i> Pittier.....	184
90. <i>Inga pinetorum</i> Pittier.....	184
91. <i>Inga popayanensis</i> Pittier.....	186
92. <i>Inga semiglabra</i> Pittier.....	186
93. <i>Inga leptoloba</i> Schlecht.....	188
94. Fruit of <i>Inga leptoloba</i> Schlecht.....	188
95. Fruit of <i>Inga ruiziana</i> Don.....	188
96. Fruit of <i>Inga monticola</i> Pittier.....	190
97. <i>Inga densiflora</i> Benth.....	190
98. <i>Inga stenopoda</i> Pittier.....	192
99. <i>Inga micheliana</i> Harms.....	194
100. <i>Inga maritima</i> Benth.....	194
101. <i>Inga lomatophylla</i> (Benth.) Pittier.....	194
102. <i>Inga codonantha</i> Pittier.....	202
103. <i>Inga pauciflora</i> Walp. & Duchass.....	214
104. <i>Inga vera portoricensis</i> Pittier.....	216
105. Fruits of <i>Inga ingoides</i> (A. Rich.) Willd.....	216

PRELIMINARY REVISION OF THE GENUS INGA.

By HENRY PITTIER.

INTRODUCTION.

In the course of his work on the flora of Panama, the author has found it almost impossible to proceed in the determination of the species of *Inga* without attempting a revision of the whole genus. Since the publication of Benthams extensive monograph, in 1875, no general study of this important group has been undertaken, although many new species have been described by Micheli, Harms, Oliver, Britton, and others. It is now found that the arrangement of the species has to undergo certain slight changes, that there have been misconceptions and unjustifiable modifications in the status of many species, and that a considerable number of new types await description in the American collections at hand. Of the latter, several collected by the author and others in Panama, Central America, and Venezuela are of unusual interest.

It was thought possible at first to limit the present study to a revision of the *Inga* species in the United States National Herbarium, but while this collection is relatively rich in new material, it did not offer many opportunities for comparison and definition of old types. This led to the present extension of the investigation, which embraces the material contained in most of the larger American herbaria.

The curators of the Gray Herbarium, the New York Botanical Garden, and the Field Museum of Natural History have most obligingly lent their extensive collections, for which grateful acknowledgment is here made. The Gray Herbarium is especially rich in specimens from old collectors, some of which are duplicates of types (if not the types themselves) of Schlechtendals Mexican species, and many others the types or duplicates of types of Benthams South American species. The John Donnell Smith Herbarium, always generously put at the disposal of botanical students, has also been freely consulted. Besides, the Director of the National Museum of Costa Rica had the kindness to lend the rich local collection of the defunct Instituto físico-geográfico, made mainly under the direction of the writer.

A general synopsis of the Central American species has been prepared for future publication, but descriptions of all new species will be published in the present series, together with other observations which may prove useful to the next monographer of *Inga* and its close ally, *Pithecolobium*.

SYSTEMATIC TREATMENT.

Section 1. LEPTINGA.

NEW SPECIES.

Inga mapiriensis Pittier, sp. nov.

A small tree 3 to 4 meters high; branchlets slender, glabrous.

Leaves entirely glabrous; petioles marginate or subulate, 0.7 to 1.3 cm. long; stipules subulate, glabrous, about 4 mm. long, early deciduous; leaflets 1-jugate, subsessile, coriaceous; glands very small, globose, pertuse; leaflet blades oblong-lanceolate to lanceolate, long-attenuate at the base, long-acuminate at the apex, the costa prominent above, the lower face delicately reticulate, the costa hardly prominent, the whole leaflet 7 to 14.5 cm. long, 2 to 4.5 cm. broad.

Inflorescences glabrous, rather few- (about 10 to 20-) flowered, single in the axils of the leaves or subpaniculate on defoliate axillary branchlets; peduncles 0.8 to 1.4 cm. long; bractlets minute, subulate, caducous; pedicels glabrous, 4 to 6 (5) mm. long; calyx tubular, 2.5 to 3 (2.7)¹ mm. long; corolla tubular, broadening toward the apex, 7 to 8 (7.6) mm. long, the lobes 1 to 2 mm. long, reflexed, minutely glandular-pubescent at the tips; staminal tube slightly exceeding the corolla.

Legume not known.

Type in the Herbarium of the New York Botanical Garden, collected at San Carlos, near Mapirí, Bolivia, at an altitude of 750 meters, flowers, August, 1907, by Otto Buchtien (no. 1768).

Also collected between Guanai and Tipuani, Bolivia, April-June, 1892, *Bang* 1421.

Closely related to *Inga heterophylla* and *I. panurensis*, the specimens cited having been identified with the former. But in that species the flowers, especially the calyces, are much smaller, the leaves, also less developed, are often 2-jugate, and the glands are very distinctly stipitate; in the latter species the flowers are also smaller, the rachis of the leaves much broader, and the glands very large and cuplike or subpeltate. In all the specimens of *I. mapiriensis* examined the umbels are comparatively few-flowered, and the leaves narrow, while in both *I. heterophylla* and *I. panurensis* the flowers are constantly very numerous and the leaflets rather broad.

Inga maxoniana Pittier, sp. nov.

PLATE 81.

A tree 10 to 15 meters high; branchlets subangulate, more or less ferruginous-tomentose.

Leaves petiolate; rachis dark brown tomentose, about 5 cm. long, the petiolar part 2 to 3 cm. long, obscurely flattened or sulcate above, the part between the leaflets narrowly canaliculate; glands very small and subsessile or obsolete; leaflets 2 or rarely 3-jugate, petiolulate; petiolules more or less pubescent,

¹ In this and parallel cases the numbers in the text are the extremes, and that in parentheses the average of 10 measurements.



INGA MAXONIANA PITTIER.

4 to 5 mm. long; leaflet blades obovate or oblanceolate, cuneate at the base, rounded and abruptly acuminate at the apex, coriaceous, finely reticulate and glabrous on both faces, those of the lower pair 7 to 10 cm. long, 3 to 4.5 cm. broad, those of the upper pair 7.5 to 14 cm. long, 3 to 5.5 cm. broad; stipules small, ovate, ferruginous-tomentose, caducous.

Inflorescences axillary, single or geminate; peduncles 1 to 5 cm. long, ferruginous-pubescent; bracteoles persistent, navicular, pubescent, about 2 mm. long; pedicels 3 to 11 mm. long, ferruginous-pubescent; calyx 4.5 to 5 mm. long, pubescent, but the pubescence shorter than on the pedicel, tubular or subcampanulate, the teeth short (about 0.5 mm. long), with rounded sinuses between; corolla 8 mm. long, densely sericeo-pubescent, the lobes acute and deeply cleft (about 1.1 mm. long); staminal tube about 7 mm. long, included; ovary about 2 mm. long, ovate-fusiform, glabrous.

Legume not known.

Type in the U. S. National Herbarium, no. 601736, collected in a coffee plantation at Aguas Negras, Venezuela, on the seaward slope of the coast range, near Antfmano, State of Miranda, flowers, April 7, 1913, by H. Pittier (no. 6012).

This species is used as a shade tree in the coffee plantations and is locally known as "guamo de hierro." On account of its hairy flowers it belongs to the *Inga quaternata* group, but it differs from that species in having smaller flowers, with the calyx not striate, and a lesser indument upon the 2-jugate leaves.

The name is given in honor of Mr. William R. Maxon, Associate Curator of the U. S. National Herbarium.

EXPLANATION OF PLATE 81.—Photograph of the type specimen of *Inga mazoniana*. Natural size.

***Inga roussovia* Pittier, sp. nov.**

PLATE 82.

A small tree; branchlets subglabrous, densely covered with ferruginous lenticels; young growth densely ferruginous-tomentose.

Rachis of the leaves subangulate, glabrous or more or less ferruginous-pubescent, 5.5 to 15 cm. long, the petiolar part 1.5 to 4 cm. long; leaflets 3 or 4-jugate, coriaceous, short-petiolulate; glands small, sessile, subglobose, often obsolete; petiolules 3 to 4 mm. long, thick, dark-colored, more or less pubescent; leaflet blades glabrous or glabrescent, obovate or ovate, cuneate at the base, rounded and obtuse, acute, or abruptly acuminate at the apex, those of the basal pair 3.5 to 6.5 cm. long and 1.5 to 3.5 cm. broad, those of the terminal pair 9 to 18 cm. long and 3.5 to 8.5 cm. broad; costa and veins glabrous or pubescent, slightly prominent above, strongly so beneath; stipules ovate, about 5 mm. long, densely ferruginous-tomentose.

Inflorescences paniculate on short axillary or terminal shoots. Umbellules single or 2 to 4-fasciculate at the defoliate nodes; peduncles grayish or brownish tomentose, 0.8 to 1.5 cm. long. Flowers long-pedicellate; bractlets very small, ovate, ferruginous-hairy; pedicels pubescent, 4 to 7 mm. long; calyx tubular, broadened at the apex, pubescent, about 5 mm. long, the teeth acute; corolla long-funnelform, 9 to 11 mm. long, densely silky-villous or pubescent without, the hairs shorter on the lobes, these 2 to 3 mm. long; staminal tube included or slightly exserted; ovary sessile, obconical, glabrous, about 2 mm. long.

Legume 11 to 17 cm. long, pedunculate (the peduncles 0.5 to 0.8 cm. long), ferruginous-pubescent, rounded at the base, apiculate, the valves flat but slightly swollen over the seeds, 2 to 2.2 cm. broad, the margins 5 to 8 mm. broad, 2-sulcate and prominent around the valves; seeds 15 to 21.

Type in the U. S. National Herbarium, no. 715483, collected in woods around San Felix, eastern Chiriquí, Panama, flowers, December 23, 1911, by H. Pittier (no. 5270).

COSTA RICA: Santo Domingo de Osa, in woods, fruits, March, 1896, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 10032).

BRITISH HONDURAS: Punta Sierra, on the banks of a highland creek, flowers, January 16, 1903, *Percy Wilson* 41.

This is the first species of the section *Leptinga* reported from Central America. It is near *Inga quaternata* Poepp. & Endl. because of its villous-tomentose flowers, but differs in its short umbellules, much larger flowers, and glabrous or subglabrous leaves. It is named for Rear Admiral H. H. Rousseau, C. E., one of the Panama Canal builders, in acknowledgement of his never-failing interest in the progress of the botanical survey of Panama.

EXPLANATION OF PLATE 82.—Fruit of *Inga roussoviana*, collected in Costa Rica by Tonduz, the specimen cited above. Natural size.

***Inga saffordiana* Pittier, sp. nov.**

A small, slender tree; bark grayish, smooth; young branchlets densely covered with long, brown hairs.

Rachis of the leaves terete, villous-hairy like the branchlets, 5 to 12 cm. long; stipules subulate, villous, persistent, 5 to 12 mm. long; leaflets 4 or 5-jugate, petiolulate, coriaceous; glands very small, long-stipitate (the stipe about 3.5 mm. long), concave; petiolules 2 to 3 mm. long, villous; leaflet blades oblique or suboblique, ovate to elliptic-lanceolate, rounded at the base, acutely acuminate at the apex, glabrous above, the costa and veins slightly prominent, beneath reticulate and glabrous except on the prominent costa and veins, sparsely long-ciliate on the margin; blades of the basal pair 3.5 to 5.5 cm. long, 2 to 2.5 cm. broad, those of the terminal pair 13 to 14 cm. long, 3 to 4 cm. broad.

Inflorescences axillary or issuing from the old wood, single, the peduncles villous, 4 to 13 cm. long; pedicels 1.5 to 2 cm. long; bractlets subulate, villous, 5 to 10 mm. long, persistent; flowers not known.

Legume (immature) thickly covered with a profusion of long brownish hairs, cuneate at the base, rounded, subemarginate, and mucronate at the apex, 15 to 32 cm. long, 2.5 to 3 cm. broad; seeds up to 17 in each pod.

Type in the U. S. National Herbarium, no. 715957, collected in the forests of Cerro de Garagará, in the Sambú Valley, southern Darién, Panama, at an altitude of about 500 meters, young pods, February 8, 1912, by H. Pittier (no. 5676).

Notwithstanding the incompleteness of the specimens, this species is so distinctly *sui generis*, that I do not hesitate to describe it as new. The known characters indicate clearly that it should take its place in the section *Leptinga*. The tree, growing in the high forest, has long, slender, flexible stems and a very sparse, short ramification. Most of the inflorescences seem to issue from the old wood of the trunk.

Named in honor of Mr. William E. Safford, Economic Botanist of the Bureau of Plant Industry, U. S. Department of Agriculture.

***Inga williamsii* Pittier, sp. nov.**

A small tree about 7 meters high, the trunk 13 cm. in diameter (Williams); branchlets terete, glabrous, the younger parts densely ferruginous-tomentose.

Rachis of the leaves terete, grayish or brownish-tomentose, 5 to 7.5 cm. long, the petiolar part 1.5 to 2.5 cm. long; stipules lanceolate, acute, 3 to 15 mm. long, caducous; leaflets 3 or 4-jugate, petiolulate; glands small, sessile,



FRUIT OF INGA ROUSSOVIANA PITTIER.

more or less obsolete in the mature leaves; petiolules 2 to 3 mm. long, pubescent; leaflets small, elliptic-lanceolate to ovate-elliptic, oblique, subcuneate at the base, acute, subacuminate, or emarginate at the apex, coriaceous, glabrous above except on the impressed, more or less pubescent costa and veins, glabrous or subglabrous beneath with prominent, pubescent costa and veins, the blades of the lowest pair 2 to 5 cm. long, 0.9 to 1.8 cm. broad, those of the apical pair 6 to 8.5 cm. long, 2 to 2.5 cm. broad.

Inflorescences single or geminate, axillary at the ends of the branchlets; umbels short-pedunculate, the peduncles ferruginous-tomentose, 1 to 1.5 cm. long; bractlets naviculiform-spatulate, ferruginous-pubescent, 2 to 3 mm. long; pedicels densely pubescent, 3.5 to 4 mm. long; calyx tubular-subcampanulate, 3.5 to 4.2 mm. long, the teeth acute, of irregular length; corolla densely villous, tubular-funnelform, 5.2 to 5.9 mm. long, the lobes about 1.2 mm. long; staminal tube hardly exerted; ovary about 2 mm. long, thick, glabrous; style usually longer than the stamens. Young pods densely ferruginous-tomentose, the mature ones not known.

Type in the Herbarium of the New York Botanical Garden, collected at Bismarck, above Penonomé, Province of Coclé, Panama, flowers and young pods, March 5, 1903, by R. S. Williams (no. 285).

This species, which belongs with *Inga lallensis* Spruce and *I. sellowiana* Benth. in the group of the Leptingae characterized by short pedicels, differs from all others heretofore described by its tomentose inflorescence, short-pedunculate umbels, and small leaves.

NOTES ON CRITICAL SPECIES.

Inga portobellensis Beurling, Svensk. Vet. Akad. Handl. 1854: 122. 1856.

PLATES 83, 84.

Although published long before his Revision of the Suborder Mimoseae, Bentham did not mention this beautiful species, discovered at Porto Bello, Panama, by Billberg, and collected more recently (1896) by Tonduz around Santo Domingo de Osa, Golfo Dulce, Costa Rica (Inst. Fís. Geogr. Costa Rica, no. 9879). Its affinities seem to be with the section Leptinga.

EXPLANATION OF PLATES 83, 84.—Pl. 83, a characteristic flowering specimen of *Inga portobellensis* collected in Costa Rica by Tonduz (Inst. Fís. Geogr. Costa Rica, no. 9879), distributed by Capt. John Donnell Smith as no. 7021; specimen in U. S. National Herbarium. Pl. 84, fruit of a specimen of the same collection in the Costa Rican National Herbarium. Both natural size.

Inga cordistipula Mart. Herb. Fl. Bras. 111; Fl. Bras. 15² 467. *pl.* 123. 1876.

This species is evidently more closely related to *I. paterno* Harms and *I. radians* Pittier, both of which will be described in this paper, than to any species of the section Leptinga. On the other hand, the last-named two species undoubtedly belong to the section Diadema, to which the former should be transferred.

Inga tarapotensis Spruce, Trans. Linn. Soc. 30: 609. 1875.

Placed by Bentham in the section Bourgonia, but evidently belonging in Leptinga. The type number, *Spruce* 4221, is represented in the Gray Herbarium and shows an umbellate inflorescence, with short-pedicel, glabrous flowers.

A specimen in the Otto Kuntze Herbarium at the New York Botanical Garden, also labeled *I. tarapotensis*, is quite distinct and may belong to *Pseud-inga*. It is, however, too imperfect for identification.

As further illustrating the characters of this section, there are here reproduced photographs of three additional species, *Inga myriantha* Poepp. & Endl. (pl. 85), *I. sertulifera* DC. (pl. 86), and *I. umbellifera* (Vahl) Steud. (pl. 87).

EXPLANATION OF PLATES 85–87.—Pl. 85, specimen of *Inga myriantha* in the Gray Herbarium, collected on the southern bank of the Amazon at the mouth of the Solimões River, June, 1851, by R. Spruce (no. 1706). Pl. 86, specimen of *Inga sertulifera* in the Gray Herbarium, collected in the vicinity of Pará, Brazil, by R. Spruce. Pl. 87, a specimen of the type collection of *Inga umbellifera* in the Gray Herbarium, collected near Panuré, along the Rio Uaupés, French Guiana, by R. Spruce (no. 2566). All natural size.

Section 2. **DIADEMA.**

NEW SPECIES.

***Inga radians* Pittler, sp. nov.**

A tree; branchlets multilenticellate, more or less angulate, the young shoots more or less ferruginous-puberulous.

Leaves petiolate, almost glabrous; rachis remotely hairy or glabrous, obscurely marginate, 10 to 14 cm. long, the petiolar part 1.5 cm. long; stipules obovate, often oblique, rounded or acute at the apex, glabrous, persistent, about 1.5 cm. long, 0.6 cm. broad; leaflets 3 or rarely 4-jugate, petiolulate; glands stipitate, often reduced to the basal one or all obsolete; petiolules 5 mm. long, winged, pubescent; leaflet blades elliptic, elliptic-ovate, or ovate, rounded or subcuneate at the base, long-acuminate at the apex, glabrous, light green above, pale green beneath, those of the basal pair 7 to 12 cm. long, 4 to 5 cm. broad, those of the apical pair 17 to 18 cm. long, 6 to 7.5 cm. broad.

Inflorescences paniculate at the ends of the branchlets, the umbels long-pedunculate, 1, 2, or 3 in the axils of the leaves; peduncles 8 to 12 cm. long, striate, minutely and sparsely puberulous; bractlets naviculiform, caducous, about 2 mm. long, the reflexed tip acute; pedicels about 2 mm. long, glabrous or sparsely puberulous; calyx 2.3 mm. long, sparsely pubescent, the teeth mostly 6, 0.3 to 0.4 mm. long, separated by rounded sinuses; corolla tubular-funnelform, 8 to 8.5 mm. long, the lobes 1.5 to 2 mm. long, the apices rounded, inflexed, covered with minute glandular hairs; staminal tube hardly exerted; ovary glabrous, elongate (nearly 3 mm. long), substipitate; style as long as the stamens.

Legume pedunculate, rounded at the base, obtuse at the apex, glabrous, 40 cm. long or less, 3 cm. thick, 6.5 to 8.5 cm. broad, the margins thick, 1.2 to 1.5 cm. broad; seeds about 15, ovoid-oblong, slightly depressed, surrounded with a white, sweet pulp.

Type in the U. S. National Herbarium, no. 408524, collected at Tapachula, State of Chiapas, Mexico, in coffee plantations, flowers, April 26, 1902, by O. F. Cook (no. 805).

A second specimen in the same herbarium is from Oaxaca, State of Oaxaca, alt. 1,650 meters, flowers, December, 1900, *Conzatti & Gonzales* 1146.

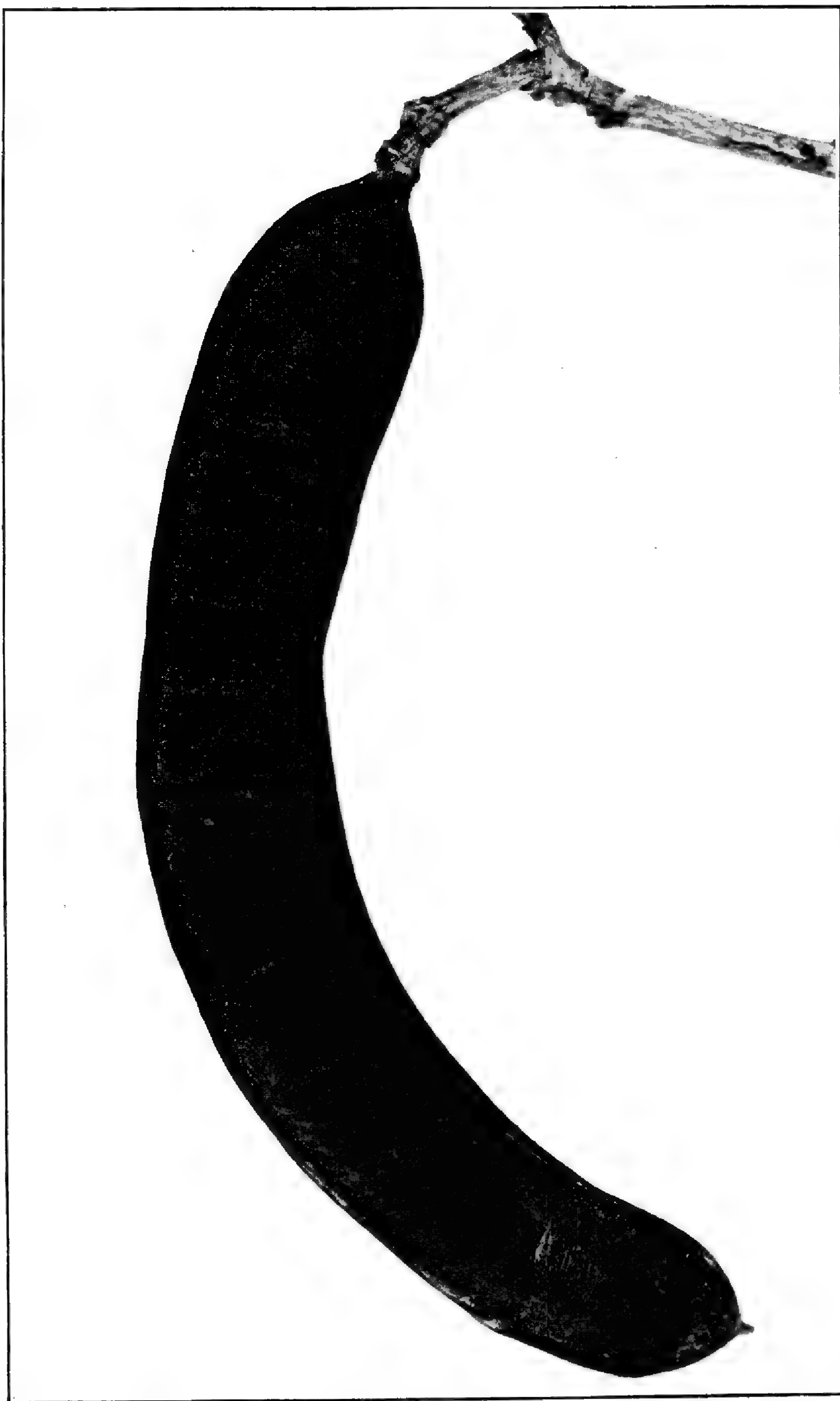
This beautiful species, used as a shade tree in the coffee plantations of Central America and Mexico under the name of “cuajiniquil,” belongs to the group of *Inga cordistipula* Mart.

The drawings given by Preuss¹ under the name of *Inga paterno* Harms probably refer to this and not to Harms's species. The two species differ mainly by the legumes, short and stipitate in *I. paterno*, very long and rounded at the base in *I. radians*. Besides the fruit characters, we find that in *I. radians*

¹ Preuss, Paul. Expedition nach Central- und Südamerika. 355. pls. 8, 9. 1901.



INGA PORTOBELLENSIS BEURLING.



FRUIT OF *INGA PORTOBELLENSIS* BEURLING.



INGA MYRIANTHA POEPP. & ENDL.



INGA SERTULIFERA DC.



INGA UMBELLIFERA STEUD.

the flowers are larger, the leaflets thinner and longer acuminate, and the glands very distinctly stipitate. In both species the fruits are prized for the thickness and flavor of the aril-like pulp surrounding the seeds.

Inga rusbyi Pittier, sp. nov.

Branchlets glabrous, subangulate, striate.

Leaves glabrous, the rachis striate and obscurely canaliculate, thick, 10 to 24 cm. long, the petiolar part 2.5 to 3 cm. long; stipules linear, obtuse, glabrous, subpersistent, 4 to 10 mm. long; leaflets 4 or 5-jugate, oblique, membranous, petiolulate; glands large, cuplike, sessile, but prominent; petiolules 2 to 3 mm. long; leaflet blades ovate-elliptic, rounded at the base, obtuse or abruptly narrowed to a broad, acute acumen at the apex, dark green above, paler and delicately reticulate beneath, those of the basal pair 4.5 to 6 cm. long, 2 to 3 cm. broad, those of the terminal pair 8 to 11 cm. long, 3 to 4 cm. broad, the intermediate pairs larger (up to 12 cm. long and 5.5 cm. broad).

Inflorescences single in the axils of the upper leaves; peduncles slender, glabrous, 4 to 8 cm. long; receptacle globose or ovoid, glabrous; bractlets linear, narrow, sparsely hairy toward the apex without, 2 to 4 mm. long, persistent; flowers numerous, sessile; calyx tubular, often substipitate, 5.1 to 6.3 (5.5) mm. long, sparsely setulose-hairy on the base and middle, densely hairy on the teeth; corolla tubular, slightly widening toward the apex, 8.2 to 9.7 (8.8) mm. long, glabrous at the base, densely villous toward the apex on the lobes, these 0.8 to 1.3 mm. long; staminal tube included.

Legume not known.

Type in the Gray Herbarium, collected at Mapirí, Bolivia, at an altitude of about 800 meters, flowers, May, 1886, by H. H. Rusby (no. 1001).

This species belongs to the group, heretofore with no known Andean representative, characterized by nude folial rachis and petiolulate leaflets. In the absence of fruit and on account of the immature condition of the leaves it is not possible to determine its affinities more closely, but the type is clearly a distinct one, not previously described.

TWO SPECIES PUBLISHED AS ONE.

Harms has published lately his *Inga paterno*, founding it, as it seems, on a plant distinct from the one illustrated by Preuss at the time of the first publication of the name.¹ Preuss's references in the body of the same work² seem to apply to the tree widely used as coffee shade in Guatemala under the name of "paterno," the fruit, for instance, being characterized as short and broad. The illustration in plate 9, however, reproduces in almost every detail the very distinct species cultivated on the Pacific coast of Guatemala, Chiapas, and Oaxaca, not only for its shade but for its long, many-seeded pods, which is described above under the name of *I. radians*. The pod in plate 8, figure 6, is also undoubtedly a reduction of the legume of this latter species.

It is possible that both species were mixed in the material studied by Harms, and in the absence of the fruits their confusion was to a

¹ Expedition nach Central- und Südamerika pl. 8. f. 6, pl. 9. 1901.

² Pages 355, 361.

certain degree excusable. The description of *Inga paterno*, although broad enough to include both types, seems to apply better to the species commonly known as "paterno." In the following paragraphs I have tried to define the specific characters more clearly, adding also those of the fruit.

Inga paterno Harms, Repert. Nov. Sp. Fedde 13: 419. 1914.

PLATE 88.

A medium-sized tree; branchlets terete, lenticellose, glabrous.

Leaves glabrous or glabrescent; rachis more or less broadly marginate between the leaflets, 8.5 to 15 cm. long, the petiolar part 2 to 2.5 cm.; stipules obovate to oblong, subobtuse, persistent, 1.5 to 2 cm. long, 0.6 to 1 cm. broad; leaflets 4 or 5-jugate, petiolulate; glands sessile, almost urceolate, sometimes obsolete or reduced to one between the basal leaflets; petiolules glabrescent, 4 to 6 mm. long; leaflet blades elliptic to ovate-lanceolate, oblique, rounded, acute, or subcuneate at the base, obtuse at the apex or acuminate with an obtuse tip, coriaceous, light green and lustrous above, dull beneath, more or less reticulate on both faces, those of the basal pair 4 to 8 cm. long, 2 to 3 cm. broad, those of the terminal pair 14 to 17 cm. long, 5 to 6 cm. broad.

Inflorescences axillary on foliate or defoliate nodes, or terminal and paniculate; spikes short-pedunculate or long-pedunculate, single or geminate; peduncles 3 to 7.5 cm. long, glabrous; bractlets subulate, pubescent, shorter than the pedicels; pedicels 1 to 2 mm. long, glabrous; calyx tubular, 1 to 2.5 (2) mm. long, almost glabrous, the teeth acute, about 0.5 mm. long, more or less puberulous; corolla glabrous, tubular-campanulate, 3.5 to 7.5 mm. long, the lobes acute, pilosulous, about 1.5 mm. long; staminal tube included; ovary glabrous, substipitate.

Legume pedunculate, laterally long-stipitate, rounded at the apex, glabrescent, 2 or 3-seeded, 9 to 12 cm. long, 4 to 5 cm. broad; seeds ovoid-oblong, about 3 cm. long and 1 cm. broad, depressed.

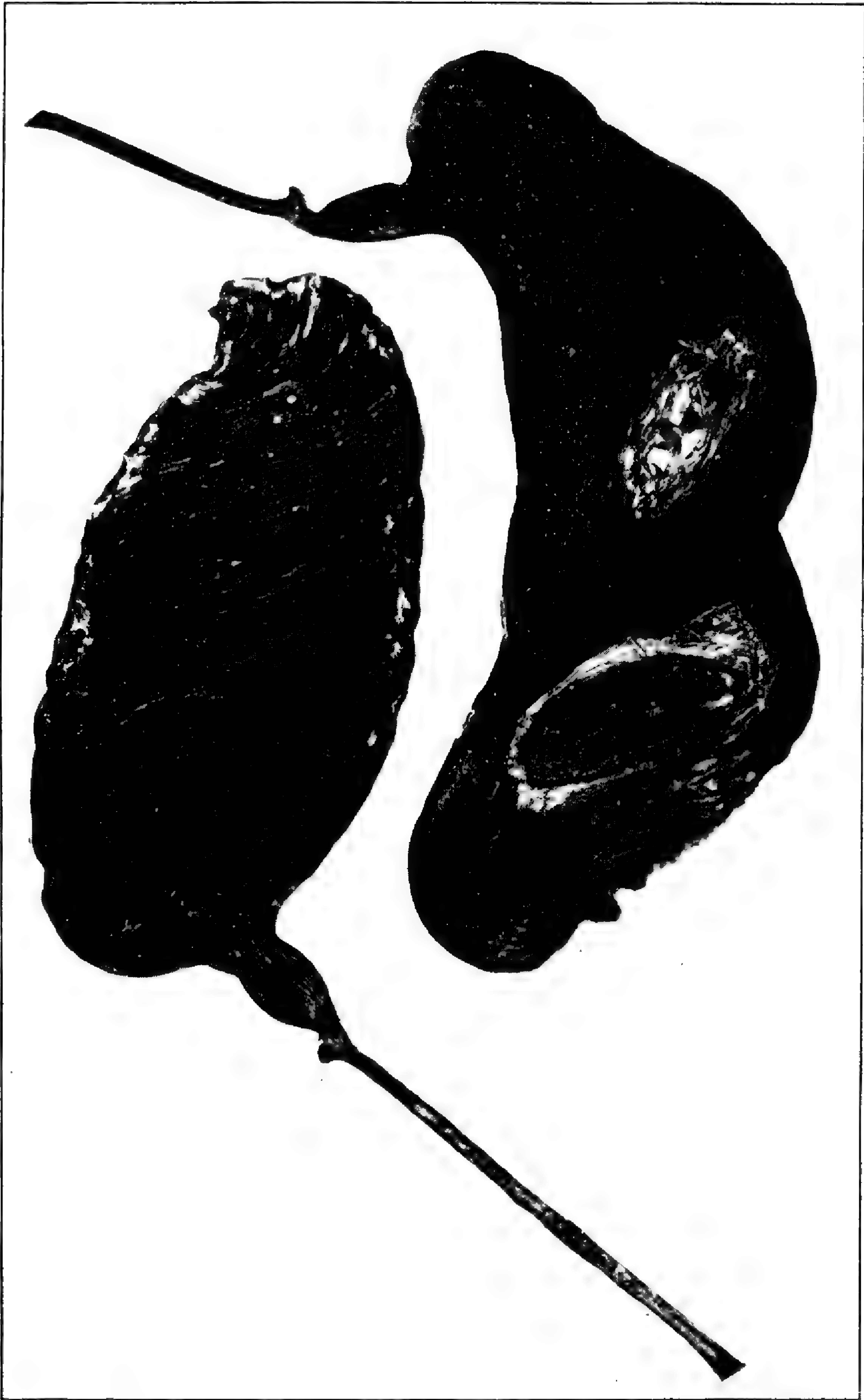
COSTA RICA: San José de Costa Rica, April 6, 1903, *Cook & Doyle* 15. In a coffee plantation near Alajuela, flowers, March, 1896, *J. D. Smith* 6490.

GUATEMALA: Barberena, Department of Santa Rosa, alt. 1,000 meters, flowers, July, 1893, *Heyde & Lux* (J. D. Smith, no 3280). San Miguel Uspantán, Department of Quiché, alt. about 2,000 meters, flowers, April, 1892, *Heyde & Lux* (J. D. Smith, no. 3309). Chinantla, near Guatemala City, fruits and flowers, May, 1892, *J. D. Smith* 2819. Escuintla, Department of Escuintla, fruits, April, 1892, *J. D. Smith* 2820. Cuajinilapa, Department of Santa Rosa, alt. 850 meters, flowers, November, 1893, *Heyde & Lux* (J. D. Smith, no 1893).

MEXICO: Oaxaca, flowers, April 9, 1894, *E. W. Nelson* 349.

Inga paterno is very variable in its characters, especially with regard to the dimensions of the flowers and leaves. The former, however, are always distinctly pedicellate, and this, along with the large, persistent stipules, distinguishes it from *I. jinicuil*, with which it often has been confused. It differs from *I. cordistipula* in the shape and number of leaflets and in the details of the much smaller flowers. The short, stipitate, few-seeded fruit is sufficient to distinguish *I. paterno* from *I. radians*, which has long, exstipitate, many-seeded legumes; but the leaflets also differ in shape, dominating number, and texture, while the floral spikes are erect in the former and loose in the latter, which has besides decidedly larger flowers.

EXPLANATION OF PLATE 88.—Two fruits of a Guatemalan specimen of *Inga paterno* mentioned above, *Heyde & Lux* (J. D. Smith, no. 2820), in the John Donnell Smith Herbarium. Natural size.



FRUIT OF INGA PATERNO HARMS.

SPECIES TRANSFERRED TO OR FROM DIADEMA.

With *Inga stipularis* DC., placed by Benthham under *Pseudinga*, series *Glabriflorae*, *I. cordistipula* Mart., considered as a *Leptinga*, and *I. cinnamomea* Spruce and *I. duckei* Huber, placed with *Diadema*, the Central American species *I. radians* Pittier and *I. paterno* Harms form a natural group, characterized by the large, foliaceous, persistent or subpersistent stipules. As the first two species further show the same short, capitate or clavate floral rachis which is characteristic of the other species of section *Diadema*, they should also be included in it.

In his notes on *Mimoseae*,¹ prefacing the enumeration of the species of *Inga*, Benthham states that the absolute character relied on for distinguishing *Inga* from *Pithecolobium* is the simply pinnate leaves. Without contradicting this assertion I feel obliged to assume, from the observation of the habit and general appearance of the trees and from the critical examination of their floral and carpological characters, that some once-pinnate species placed in the genus *Inga* really belong to the section *Caulanthion* of *Pithecolobium*. I refer to *Inga tubulifera*, *I. rufescens*, *I. globulifera*, and *I. billbergiana*, which are very closely related to each other and at the same time look strikingly like *Pithecolobium glomeratum*, but for their once pinnate leaves. In Panama I collected flowering and fruiting specimens of *I. rufescens* and of some related forms which I take to be *I. globulifera* and *I. billbergiana*. The trees had unmistakably the appearance of the above-mentioned *Pithecolobium*, and this likeness was thoroughly confirmed by the prefloral arrangement of the buds and especially by the curled, dehiscent, bright red pods. Considering that characters drawn from the flowers and fruits should have in every case more weight than one single leaf peculiarity, I do not hesitate to propose the transfer of these species, which also should be reduced to two, as follows:

***Pithecolobium tubuliferum* (Benth.) Pittier.**

Inga tubulifera Benth. Lond. Journ. Bot. 4: 584. 1845.

***Pithecolobium rufescens* (Benth.) Pittier.**

Inga rufescens Benth. op. cit. 4: 585.

Inga globulifera Benth. loc. cit.

Inga billbergiana Benth. loc. cit.

Section 3. BOURGONIA.

CRITICAL NOTES ON SEVERAL SPECIES.

Benthham divides this section into two groups, the one containing the species with axillary, elongate spikes; the other those with short spikes, usually clustered on defoliate nodes. *Inga bourgoni* (Swartz)

¹ Lond. Journ. Bot. 4: 578. 1845.

DC., the type of the section, placed in the second group, hardly belongs there, as its inflorescence does not differ sensibly from that of *I. marginata* or the other species of the first group, while it is very distinct from the dense, short panicles of *I. aggregata* or *I. alba*.

Inga alba (Swartz) Willd. Sp. Pl. 4: 1013. 1806.

Mimosa alba Swartz, Prodr. Veg. Ind. Occ. 85. 1788.

Represented in the Gray Herbarium by several of Spruce's collections (246, 1076, 2289) identified by Bentham, and, in all the herbaria consulted by me, by *Rusby & Squires* 186, from Santa Catalina, Lower Orinoco, Venezuela. The specimens of this last number were distributed as *Inga bourgoni* DC., but the flowers are much smaller than in that species, and the type of the inflorescence is very distinct. The large, flat glands and the strongly veined leaves also are characteristic of *I. alba*. The average dimensions of 5 flowers of *Spruce* 2289 are 1.2 to 1.5 (1.3) mm. for the calyx and 3.4 to 3.8 (3.6) mm. for the corolla, as against 1 mm. and 3.1 mm., which are the dimensions given by Bentham.

Inga aggregata Don, Hist. Dichl. Pl. 2: 391. 1832.

Represented in our collections by *Bang* 1439, from between Guanai and Tipuani, Bolivia, also distributed under the name of *I. bourgoni*. Although I have not seen authenticated material of that species, the *Bang* specimens agree so well with the descriptions that I have no doubt about their identity.

Inga marginata Willd. Sp. Pl. 4: 1015. 1806, excl. syn.

This species is known to be exceedingly variable. In Central American specimens the flowers are usually pedicellate, though very shortly so; the calyx is always pubescent and the corolla broader and shorter than in the Brazilian tree. The form with marginate folial rachis is very seldom met with, and wings are present below both the basal and terminal pairs of leaflets. However, as all grades of transition are observed between the extreme forms, the separation of the species into subspecies is hardly practicable.

Undescribed species of the *marginata* group probably will be found in Central America. Mr. William R. Maxon collected at Las Animas, near Mazatenango, Guatemala, specimens whose leaves resemble those of the marginate form of *Inga marginata*, or those of *I. laurina*, the leaflets being either 2 or 3-jugate. But the flowers are larger and the perfect pods are from 3 to 3.5 cm. broad and 12 cm. long, with a strongly prominent margin. It does not seem desirable to describe this as a new species until further material is obtained.

The same variability is noticed in *I. laurina* (Swartz) Willd., two or three apparently constant forms of which are found in Central America. The type is West Indian and the area of the species probably limited to the West Indies and the continental section between Panama and Mexico. The identification of the Bolivian plant distributed under this name by Dr. Buchtien (under no. 1767) is doubtful, but the specimens at hand are insufficient for the determination of their real relationship.

Section 4. PSEUDINGA.

Series 1. GLABRIFLORAE.

This group consists of a few Brazilian species, and has received no increase recently. Among its species *Inga capitata* Desv. is best known and has several varieties. Some specimens distributed under this name to American herbaria were found to belong to two distinct species of *Pithecolobium*.

Series 2. GYMNOPODAE.

NEW SPECIES.

Inga aestuariorum Pittier, sp. nov.

PLATE 89.

A small, low, spreading tree, branching from near the ground; branchlets more or less ferruginous-pubescent, covered with white, dotlike lenticels.

Rachis of the leaves slender, terete or subangulate, densely ferruginous-hairy, 9 to 15 cm. long, the petiolar part 1.5 to 2.5 cm. long; leaflets 5 or 6-jugate, short-petiolulate, coriaceous; glands subsessile, prominent, cuplike, blackish; petiolules 1 mm. long or shorter; leaflet blades ovate to ovate-elliptic, broadly rounded and subemarginate at the base, obtuse or subacute and mucronate at the apex, pilosulous and more or less lustrous above, reticulate and sparsely pubescent beneath, the costa densely pubescent and prominent on both faces, the veins also pubescent and prominent beneath; leaflets of the basal pair 3 cm. long, 2 cm. broad, those of the terminal pair 6 to 12 cm. long, 2.5 to 4.5 cm. broad.

Floral spikes single or geminate in the axils of the upper leaves; peduncles and rachises densely ferruginous-pubescent, the former 3 to 5 cm. long; flower heads loose, elongate, 3 to 4 cm. long; flowers sessile; bractlets very small, ovate, acute, densely pubescent, deciduous; calyx tubular, striate, pubescent, 7 mm. long, the teeth very short; corolla tubular, very slightly broadened at the apex, 18.5 mm. long, white, silky-villous, the lobes narrow, about 2.5 mm. long; stamens pink, the tube hardly exserted; pistil glabrous, the style a little longer than the stamens.

Legume sessile, rounded at the base, apiculate, 14 to 20 cm. long, the valves flat, about 1.7 cm. broad, glabrescent, the margin 5 mm. broad, elevated around the valves, densely ferruginous-pubescent. Seeds about 10, immersed in a white, sweet pulp.

Type in the John Donnell Smith Herbarium, collected in the tide belt of the Pacific coast at Boca Zacate, Diquís Delta, Costa Rica, flowers and fruits, April, 1892, by A. Tonduz (Inst. Fís. Geogr. Costa Rica, no. 6793).

Also collected at Laguna de Sierpe, Costa Rica, *Pittier*.

This species belongs to the group of *I. multijuga*, but differs from that species primarily in the number of the leaflet pairs, in the shape and pubescence of the leaflets, and in the size of the flowers. While the former is stated to be a tree 7 to 15 meters high, *I. aestuariorum* is low and bushy, growing preferably along the tide channels in close proximity to the sea.

EXPLANATION OF PLATE 89.—Fruit of a specimen of the type collection of *Inga aestuariorum* in the Costa Rican National Herbarium. Natural size.

Inga latipes Pittier, sp. nov.

A tree; branchlets slender, angulate.

Rachis of the leaves wingless, glabrous, canaliculate or submarginate, 3 to 5 cm. long, the petiolar part about 1 cm. long; stipules not seen, caducous; glands large, sessile, subglobose or depressed; leaflets 3-jugate, scarcely oblique, coriaceous, the petiolules about 2 mm. long, sparsely pubescent or glabrescent, the blades ovate-elliptic, rounded-cuneate at the base, obtuse, acute, or acuminate at the apex, 3.5 to 12 cm. long, 2 to 4.5 cm. broad, glabrous, lustrous above, with slightly prominent costa and veins, paler and obscurely reticulate beneath, with very prominent costa and veins.

Inflorescence not known.

Legume subligneous, pedunculate, short-stipitate, 9 to 31 cm. long, about 4 cm. broad, broadly rounded at base and apex, glabrous, blackish, transversely

striate, the seeds very prominent, the margins thin and sulcate, the stipe slender, about 8 mm. long, the peduncles 3.5 cm. long.

Type in the John Donnell Smith Herbarium, collected at Las Vueltas de Tucurrique, Reventazón Valley, Costa Rica, in forests, at an altitude of 900 to 1,000 meters, fruits only, April, 1899, by A. Tonduz (Inst. Fís. Geogr. Costa Rica, no. 13056).

The leaves recall those of *Inga leptopoda* Schlecht., but the legumes are strikingly distinct from those of any other known species.

***Inga cycladenia* Pittier, sp. nov.**

Branchlets terete, the minute pubescence covering the numerous dotlike lenticels.

Rachis of the leaves minutely pubescent, slightly marginate, 3.5 to 4.5 cm. long, the petiolar part 1.5 to 2 cm.; stipules lanceolate, acuminate, pubescent, about 7 mm. long; leaflets 2-jugate, coriaceous, very shortly petiolulate (petiolules about 1 mm. long); glands orbicular, peltate, up to 4 mm. in diameter; leaflets ovate, broadly cuneate at the base, abruptly contracted into a narrow acumen nearly 2 cm. long, sparsely pilosulous and lustrous above, minutely soft-puberulent beneath, 11.5 to 14.5 cm. long, 5 to 7 cm. broad, the densely pubescent costa and veins very prominent beneath.

Floral spikes 2 to 4-clustered in the axils of the terminal leaves, the peduncles pubescent, angulate, 3 to 5 cm. long, the flower heads short and dense; flowers small, sessile; calyx tubular-campanulate, sparsely and minutely pubescent, 3.4 to 4 (3.8) mm. long; corolla tubular, gradually broadening toward the apex, silky-pubescent, 6.6 to 7.4 (7.1) mm. long, the lobes broad, acute, 1.5 to 2 mm. long; staminal tube included, the stamens (measured from the base) about twice the length of the corolla, the capitate style slightly longer.

Legume not known.

Type in the Herbarium of the New York Botanical Garden, collected at Micay-Sayjá and Timbiquí, Colombia, flowers, June, 1901, by F. C. Lehmann (B. F. 662).

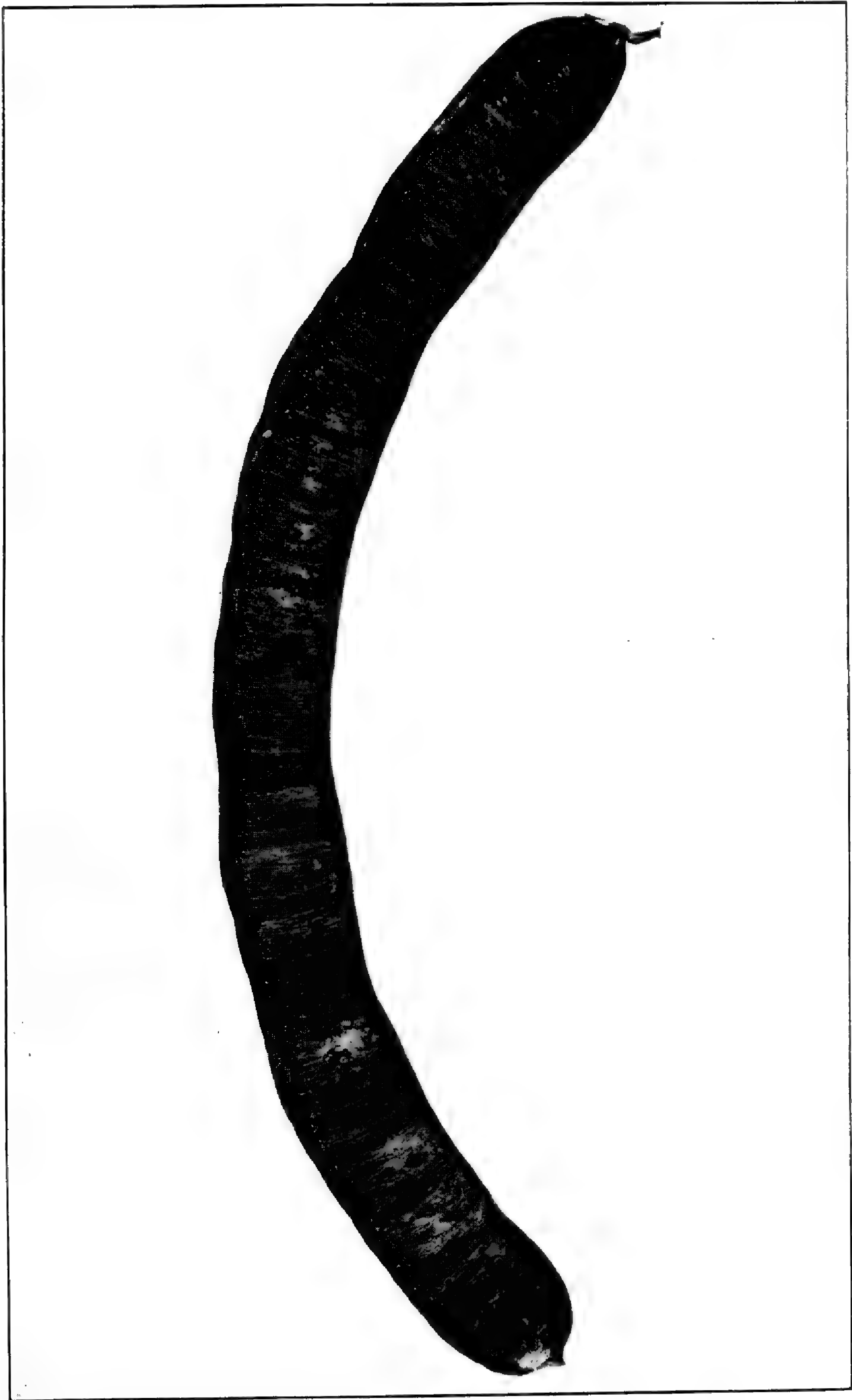
Conspicuous by its enormous discoid glands, this species reminds one somewhat of *Inga rufinervis* in the pubescence and arrangement of the inflorescence, and of *I. acrocephala* in the size of the flowers, these, however, being very distinctly shaped.

***Inga myriocephala* Pittier, sp. nov.**

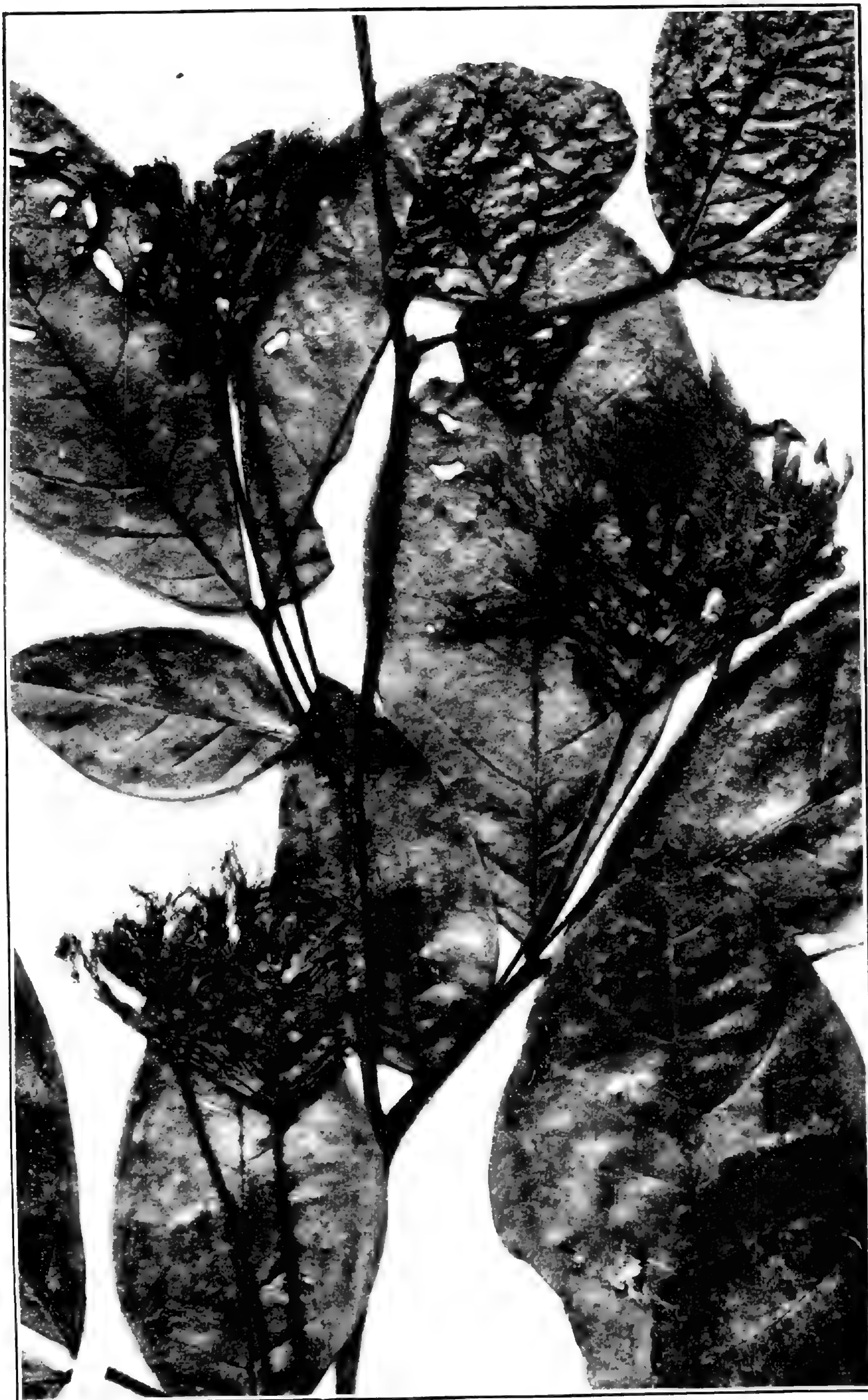
Branchlets angulate, densely set with linear-elliptic lenticels, the younger parts ferruginous-pubescent.

Rachis of the leaves glabrous, slightly marginate beneath each pair of leaflets, 5 to 15 cm. long, the petiolar part 1 to 4 cm. long; stipules linear, acute, about 8 mm. long, glabrescent, deciduous; leaflets 4-jugate, rarely 2 or 3-jugate, more or less oblique, short-petiolulate, coriaceous, glabrous; glands small, globose, pertuse, subsessile; leaflet blades elliptic-lanceolate, acute at the base, acuminate at the apex, dark green above, paler or ferruginous and reticulate beneath, the costa and veins slightly prominent on both sides, the blades of the basal pair 7.5 to 8.5 cm. long, 3 to 3.5 cm. broad, those of the upper pair about 15 cm. long, 6 cm. broad.

Inflorescences very numerous, paniculate on the terminal branchlets; spikes 2 or 3-clustered in the axils of undeveloped leaves, the peduncles 2 to 3 cm. long, slender, sparsely ferruginous-pubescent, the flower heads dense, very short, broader than long; flowers sessile; bractlets spatulate or subulate, glabrescent, about 2 mm. long, subpersistent; calyx tubular, 5.1 to 5.8 (5.4) mm. long, sparsely and minutely pubescent, the teeth very short and obtuse; corolla



FRUIT OF INGA AESTUARIORUM PITTIER.



INGA PINETORUM PITTIER.

tubular, 8.5 to 9.3 (9) mm. long, silky-pubescent, the lobes 0.5 to 1 mm. long; staminal tube included; stamens short, but exceeding the truncate style.

Legume flat, thin, glabrous, about 9 cm. long and 2.3 cm. broad, the prominent, thin margins bordering the valves.

Type in the U. S. National Herbarium, no. 32671, collected at Mapirí, Bolivia, at an altitude of about 800 meters, flowers and fruits, May, 1886, by H. H. Rusby (no. 1003).

This species is distinguished from its close relatives by the glabrous leaves, 4-jugate leaflets, and large paniculate inflorescences with numerous short and broad flower heads. The legume described seems to be immature. *Inga myriocephala* may be closely related to *I. acrocephala* Steud., from Surinam, but differs in the short petiolules, in having the costa and veins slightly prominent on both faces of the leaflets, and in the larger flowers.

Inga pinetorum Pittier, sp. nov.

PLATE 90.

A tree; branchlets densely ferruginous-hairy, lenticellose.

Rachis of the leaves terete, densely ferruginous-pubescent, 2.5 to 3.5 cm. long, the petiolar part 0.5 to 1.2 cm. long; stipules ovate-acuminate, 3 to 4 mm. long, hairy, persistent; leaflets 2-jugate, petiolulate; glands very small, substipitate, urceolate, pertuse, smooth outside; petiolules densely ferruginous-hairy, about 3 mm. long; leaflet blades suboblique, obovate, cuneate at the base, subobtuse and mucronate or sometimes acuminate at the apex, coriaceous, the upper face darkish, dull (in sicco), and sparsely hairy except on the brownish-pubescent costa and the impressed veins, light brown and pilosulous beneath, with the costa, veins, and venules prominent, the blades of the lower pair 4 to 6.5 cm. long, 2 to 3.5 cm. broad, those of the upper pair 8 to 12 cm. long, 3 to 5 cm. broad.

Inflorescences axillary; floral spikes geminate, 7 to 9 cm. long; peduncles 5 to 6.5 cm. long, terete, ferruginous-hairy; rachis hairy, 1 to 2 cm. long; flowers sessile; calyx tubular, stipitate, 6.5 to 7.2 (6.9) mm. long, sparsely hairy, the teeth rather narrow and acute; corolla tubular-funnelform, silky-villous, 11.4 to 11.7 (11.6) mm. long, the lobes nearly 3 mm. long, narrow, acute; staminal tube slightly exserted; pistil about 4 cm. long; ovary long-stipitate, fusiform, glabrous; style subtruncate.

Legume not known.

Type in the Gray Herbarium, collected at Pineridge, near Manatee Lagoon, British Honduras, flowers, February 19, 1906, by M. C. Peck (no. 343).

Though identified as *Inga leptopoda*, this is a species quite distinct on account of its peculiar hairiness, its long flowers, and the fusiform, stipitate ovary.

EXPLANATION OF PLATE 90.—From a photograph of the type specimen of *Inga pinetorum*. Natural size.

Inga popayanensis Pittier, sp. nov.

PLATE 91.

Branchlets terete or subangulate, the younger parts glabrous or glabrescent, 3-angulate.

Rachis of the leaves terete or submarginate, glabrous (pubescent as is the whole leaf at an early stage), 3 to 6.5 cm. long, the petiolar part 1.5 to 2 cm.; stipules linear-lanceolate, subulate, glabrous, 6 to 8 mm. long, caducous; leaflets 2 or 3-jugate, oblique, petiolulate, coriaceous; glands sessile, globose or urceolate, pertuse, sometimes obsolete; petiolules thick, 3 to 4 mm. long, glabrous; leaflet blades lanceolate, cuneate at the base, long-acuminate at the apex, dark green, glabrous or glabrescent, and sublustrous above, dull, rusty-colored, and sparsely pubescent beneath, the costa and veins glabrous and slightly prominent on the upper face, pubescent and very prominent beneath, the blades of

the basal pair 5 to 9 cm. long, 1.5 to 3 cm. broad, those of the terminal pair 7 to 14 cm. long, 2 to 4.5 cm. broad.

Inflorescences single or 2 to 5-clustered in the axils of the upper leaves; peduncles angulate, striate, more or less minutely appressed-pubescent, 2 to 6.5 cm. long; flower heads ovoid, 0.8 to 2 cm. long, the basal flowers deciduous during the elongation; flowers sessile; bractlets subulate, glabrous, 2 to 3 mm. long, caducous; calyx tubular, slightly constricted above the base, striate, minutely and sparsely pubescent, 6 to 7 (6.5) mm. long, the teeth about 1.5 mm. long, rounded at the apex; corolla tubular, slightly broadening above the calyx, 9 to 11.5 (10.4) mm. long, silky-pubescent, the lobes lanceolate, acute, reflexed, 2 to 3 mm. long; staminal tube exserted; style 22 to 23 mm. long, glabrous; ovary stipitate, depressed, about 2.5 mm. long; style clavate at the apex.

Legume not known.

Type in the John Donnell Smith Herbarium, collected in forests in the highlands of Popayán, Colombia, between 1,500 and 2,200 meters, by F. C. Lehmann (no. 5751).

There is a duplicate in the Herbarium of the New York Botanical Garden. Also collected near Popayán, Colombia, at 1,500 to 1,900 meters, flowers, August, 1881, *Lehmann* 829, and in Colombia (without exact locality data), *Lehmann* 7808.

While the calyx and corolla agree in size with those of *Inga nobilis* Willd., the stamens and style are much shorter and the pubescence distinct. The flowers, besides, are always sessile, with glabrous, subulate bracts. But the fundamental difference is in the lanceolate leaflets, with a larger number of parallel veins, hardly apparent venation, and a long, gradually narrowing acumen. Notwithstanding these very manifest characters, Micheli¹ identified this plant (no. 829) as *I. nobilis*.

EXPLANATION OF PLATE 91.—Specimen of *Inga popayanensis* in the John Donnell Smith Herbarium, *Lehmann* 7808, cited above. Natural size.

Inga semiglabra Pittier, sp. nov.

PLATE 92.

A tree about 13 meters high (Eggers); branchlets terete, slender, glabrous, the younger parts also glabrous or glabrescent.

Leaves entirely glabrous, the rachis terete, slender, 4 to 8.5 cm. long, the petiolar part thicker and dark-colored at the base, 1 to 3 cm. long; leaflets 3-jugate, membranous, petiolulate; glands small, sessile, orbicular, concave; petiolules dark-colored, about 3 mm. long; leaflet blades ovate or obovate to lanceolate, long-cuneate at the base, acuminate at the apex, light green above, paler beneath, the costa and veins prominent on both sides, but more so beneath, the blades of the basal pair 3.5 to 6 cm. long, 2.5 to 3 cm. broad, those of the terminal pair 9 to 14.5 cm. long, 3 to 5 cm. broad.

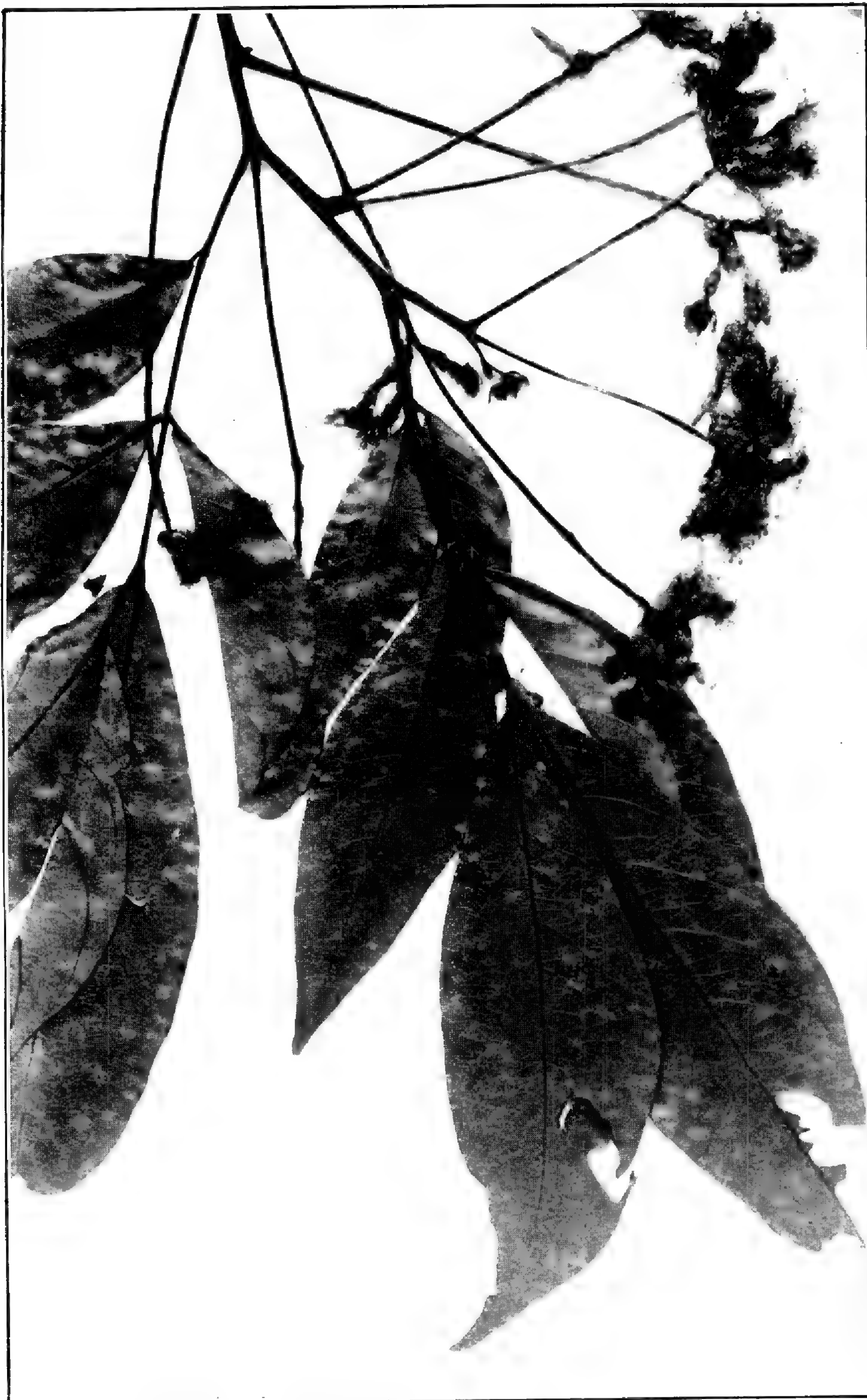
Inflorescences axillary or terminal, the spikes single or 2 or 3-clustered; peduncles slender, 2.5 to 4 cm. long, the flower heads elongating and dropping their flowers from the base (rachis 2.5 to 3 cm. long); flowers sessile; bractlets small, ovate-acuminate, caducous; calyx tubular, slightly broadening toward the apex, covered with few minute appressed hairs, 5 to 6 mm. long, the obtuse teeth ending with a tuft of (glandular?) hairs; corolla tubular, broadened above the calyx, 9.3 to 10.7 (9.8) mm. long, glabrous on the lower half, minutely pubescent on the exposed upper half, the lobes broad, acute, inflexed, 1 to 2 mm. long; staminal tube short-exserted, the stamens 2 to 2.5 cm. long; pistil glabrous, 2.2 cm. long; ovary short, stipitate.

Legume not known.

¹ Bot. Jahrb. Engler 16: Beibl. 37:9. 1892.



INGA POPAYANENSIS PITTIER.



INGA SEMIGLABRA PITTIER.

Type in the John Donnell Smith Herbarium, collected at El Recreo, Ecuador, flowers, December 14, 1896, by Baron Eggers (no. 15464). The same number is also in the Herbarium of the Field Museum.

Closely related to *Inga leiocalycina* Benth. of Brazil and British Guiana, but the pubescence is sparser, the glands small, the leaflets 3-jugate, the calyx sparsely covered with minute hairs, the corolla glabrous on the lower half, the staminal tube exserted, etc.

EXPLANATION OF PLATE 92.—A specimen of the type collection of *Inga semiglabra* in the Herbarium of the Field Museum of Natural History, no. 143132. Natural size.

NOTES ON CRITICAL SPECIES.

***Inga multijuga* Benth.** Trans. Linn. Soc. 30: 615. 1875.

Probably founded on Sutton Hayes's specimens from Panama, which I have not seen. Numbers 641, 729, 734, and 739 of the Guatemalan collection of Cook and Griggs (1902) agree with the diagnosis, except that in no. 641, the only one with flowers, the leaflets are only 5 or 6-jugate. The length of the calyx varies from 7 to 8 mm., and that of the corolla between 23 and 25 mm. The leaflets are always rounded at the base and either acute or acuminate at the apex; in size, they keep within the limits given by Bentham, except in no. 739, which, it is surmised, was taken from a sapling. These specimens show a close resemblance to *I. thibaudiana*, but the flowers are longer and more in accordance with the description of the above-named species.

Fendler's no. 51, from Chagres, Panama, cited after the diagnosis of *I. multijuga* and represented in the Gray Herbarium, is more likely to be a large-flowered form of *I. ruiziana*. The calyx measures only 4.3 mm. and the longest corolla 16.1 mm., which is much under the dimensions given for *I. multijuga*.

The identification of specimens from Costa Rica (Inst. Fís. Geogr. Costa Rica, no. 6793) as this species by Michell is also wrong. These represent a distinct type which I have described above as *Inga aestuariorum* Pittier.

***Inga peltadenia* Harms,** Verh. Bot. Ver. Brand. 48: 160. 1906.

This species, if distinct, is very closely related to *Inga thibaudiana* DC., and is characterized mainly by the very large, peltate glands. Most of the Bolivian specimens in our collections classified under the last name would belong to the former type. The legume, as shown by Williams's no. 575 (Herb. N. Y. Bot. Gard.) from Zumupasa, Bolivia, is straight or almost so, flattened, rounded at the base, apiculate, about 19 cm. long, fulvous-pubescent, the faces flat, 2 cm. broad (including the elevated margins, these about 3 mm. broad); seeds 12 to 18. According to Bentham¹ the pods of *I. thibaudiana* are from 15 to 30 cm. long, 1.9 to 2.6 cm. broad, and identical with those of the former in their other characters.

***Inga punctata* Willd.** Sp. Pl. 4: 1016. 1806, excl. syn.

This species and *I. leptoloba* Schlecht., besides being both variable, are easily confused. An attempt has been made at separating two conspicuous varieties of the first, and others could undoubtedly be established within the latter species. This task, however, is made difficult by the scarcity of complete specimens, including mature pods.

The following characters seem to be essential in *I. punctata*: The leaflets are, as a rule, 2-jugate, broadly ovate, broadly rounded at the base, long and sharply acuminate, with an almost membranous texture and distant veins;

¹ In Mart. Fl. Bras. 15²: 480. 1876.

the mature pods are 2.5 cm. broad, rounded at the base, and at most very shortly stipitate; and the seeds are separated by deep transverse furrows.

Inga leptoloba Schlecht. *Linnaea* 12: 559. 1830.

PLATES 93, 94.

In this species the leaflets are 3-jugate, very seldom fewer, ovate-elliptic or oblong-elliptic, usually cuneate or subcuneate at the base, with a broader acumen than in *I. punctata*; their texture also is firmer and the veins are nearer together; the mature pods are narrower, fuller, distinctly stipitate or at least cuneate, never broadly rounded, at the base.

An illustration of the fruit of *I. ruiziana* Don, another species of the same series, is given in plate 95.

EXPLANATION OF PLATES 93-95.—Pl. 93, from a field photograph of *Inga leptoloba* taken at Setzimaj, Guatemala, March 19, 1902, by Mr. G. N. Collins. Pl. 94, fruit of a specimen collected along the Río Torres at San Francisco de Guadalupe, near San José, Costa Rica, by Tonduz (Inst. Fís. Geogr. Costa Rica, no. 8010); specimen in the John Donnell Smith Herbarium. Pl. 95, two fruits of *Inga ruiziana* Don, in the U. S. National Herbarium, collected at Gamboa, Canal Zone, Panama, March 29, 1914, by H. Pittier (no. 6520). All natural size.

Series 3. PILOSIUSCULAE.

NEW SPECIES.

Inga cobanensis Pittier, sp. nov.

A tree, the young branchlets terete, densely ferruginous-pubescent.

Rachis of the leaves winged, 3.5 to 7.5 cm. long, ferruginous-pubescent, the petiolar part wingless, thicker at the base, 1.2 to 2 cm. long, the wings obovate, up to 8 mm. broad; stipules not seen; glands small, sessile, deep-pitted, transversely compressed; leaflets 3-jugate, oblique, coriaceous, the petiolules ferruginous-hairy, up to 2 mm. long, the blades ovate, rounded at the base, acute or subacuminate, glabrous above except on the ferruginous-pubescent costa and veins, reticulate and rufous-tomentose beneath, with the costa and veins densely pubescent and prominent; blades of the basal pair of leaflets 3 to 5.5 cm. long, 1.5 to 2.5 cm. broad, those of the terminal pair 7 to 11 cm. long, 3.5 to 5.5 cm. broad.

Floral spikes 3 to 6-clustered in the axils of the upper leaves, the peduncles terete, densely ferruginous-pubescent, 1 to 3 cm. long, the flower heads elongate, many-flowered; bractlets linear, acute, densely ferruginous-hairy, shorter than the calyx; flowers sessile; calyx densely rufous-pubescent, 4.3 to 6.3 (5.3) mm. long, the teeth short, triangular, acute; corolla 11.6 to 13.2 (12.4) mm. long, densely fulvous or rufous-villosulous, the lobes ovate-lanceolate, acute, 1.5 to 2 mm. long; staminal tube included, seldom slightly exserted, the filaments very long (about 3 cm. from base of the tube); ovary sessile, glabrous, flattened; style about 4.5 cm. long.

Legume not known.

Type in the John Donnell Smith Herbarium, collected at Cobán, Alta Verapaz, Guatemala, at an altitude of about 1,450 meters, flowers, April, 1887, by H. von Türckheim (J. D. Smith, no. 1214).

This species was distributed under the name *Inga edulis* Mart., but differs in its 3-jugate leaflets, smaller flowers, etc. The shape of the ovary seems to indicate a flat pod. On account of this and taking into account the other characters, I place *I. cobanensis* in the present section and series.

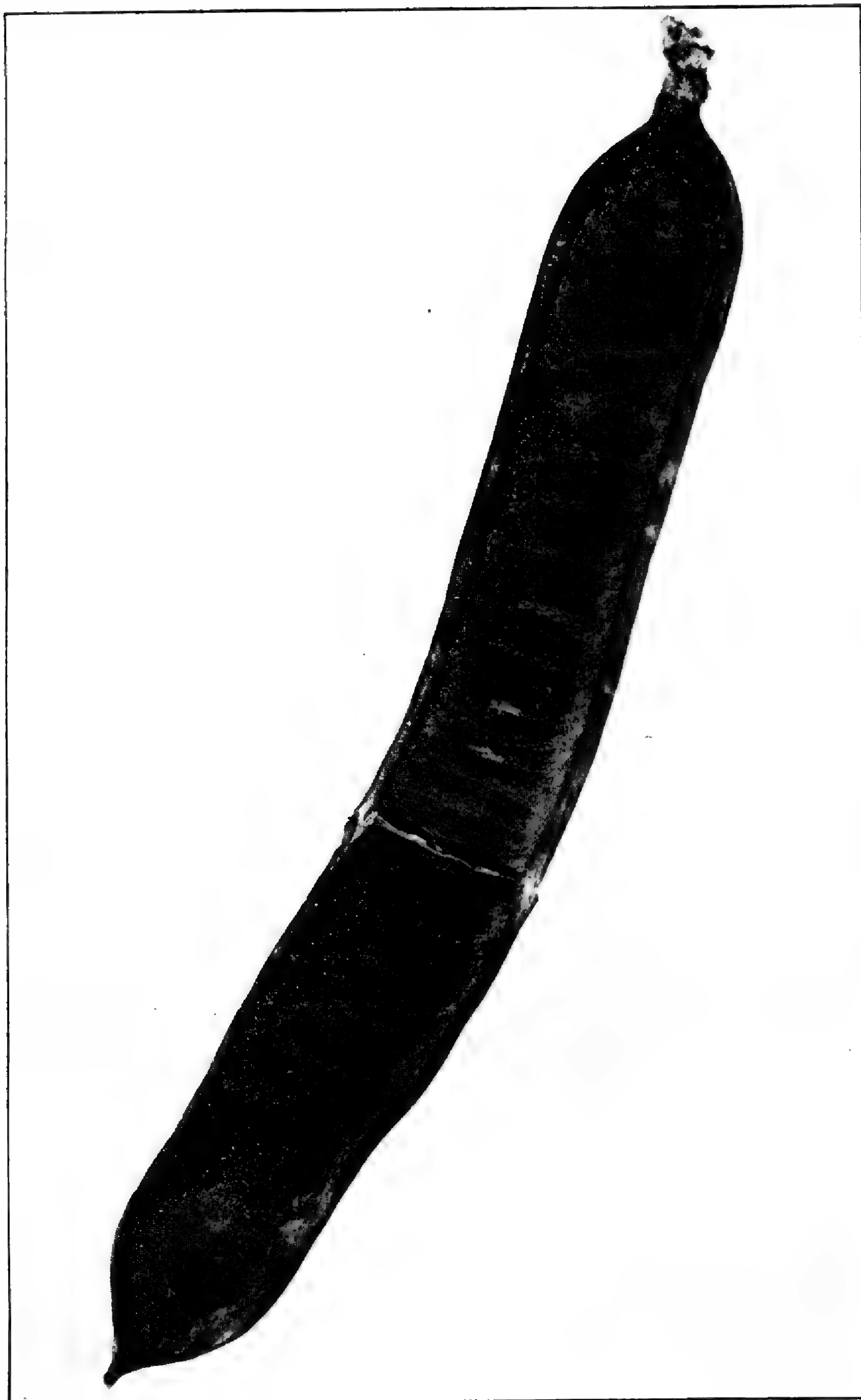
Inga hostmannii Pittier, sp. nov.

Branchlets angulate, thick.

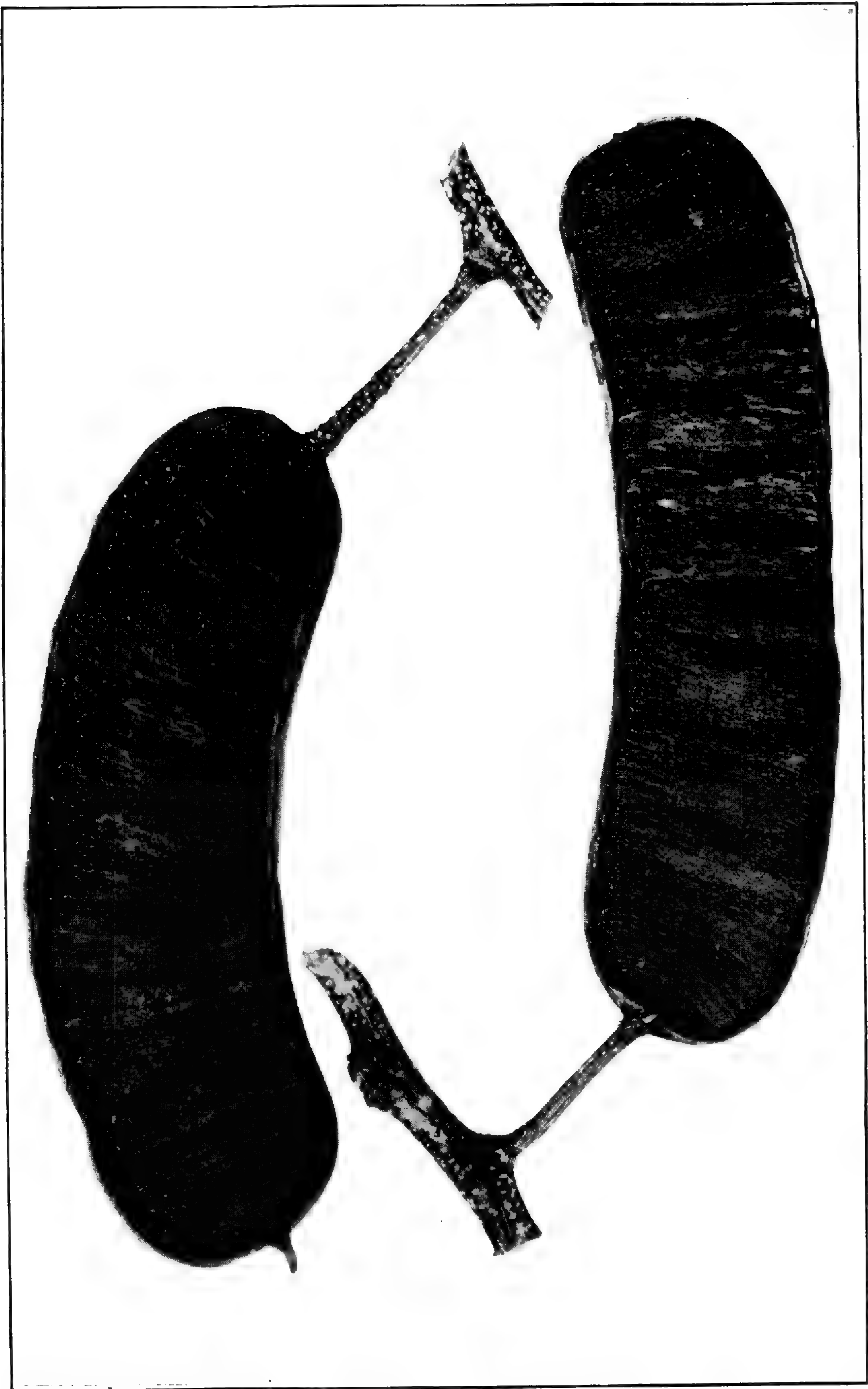
Leaves entirely glabrous; rachis narrowly winged or marginate, 1.5 to 2.5 cm. long, the petiolar part 0.5 to 0.7 cm. long; leaflets 2-jugate, coriaceous, stiff,



INGA LEPTOLOBA SCHLECHT.



FRUIT OF *INGA LEPTOLOBA* SCHLECHT.



FRUIT OF INGA RUIZIANA DON.

petiolulate, more or less oblique; glands sessile, scutellate; petiolules thick, rugose, about 3 mm. long; leaflet blades ovate or obovate, cuneate-attenuate at the base, obtuse and emarginate at the apex, the costa and veins prominent on both faces, the blades of the basal pair 5.5 to 6.5 cm. long, 3 to 4 cm. broad, those of the terminal pair 8 to 14 cm. long, 4.5 to 6.5 cm. broad.

Inflorescence corymbose on axillary or terminal defoliate branchlets, the floral spikes single or geminate; peduncles glabrous or sparsely pubescent, 1.5 to 2.5 cm. long; flower heads elongate, dense at first, but the flowers somewhat remote later; flowers sessile; bractlets ovate, conchoid, pubescent without, 3 to 5 mm. long, caducous; calyx pubescent, more or less distinctly striate, 7 to 8 mm. long, the teeth ovate, rounded at the apex; corolla 15 to 17 mm. long, silky-villous, the lobes narrow, obtuse, about 3 mm. long.

Legume not known.

Type in the Gray Herbarium, collected in Surinam by F. W. Hostmann; other data not given.

The leaves and the arrangement of the inflorescence agree with the description of *Inga splendens* (Poir.) Willd., but the flowers are much smaller. This species corresponds to none of those enumerated by Bentham as collected by Hostmann in Surinam.¹

***Inga langlassei* Pittier, sp. nov.**

A tree 8 to 10 meters high (Langlassé); young branchlets velvety ferruginous hairy.

Rachis of the leaves winged, velvety-hairy (like the branchlets), 14 cm. long, the petiolar part almost nude, 2.5 cm. long, the wings sparsely villous; leaflets 5-jugate, petiolulate; glands stipitate, blackish, the pit broad, dark at the bottom, with light brown rim; petiolules densely hairy, about 1 mm. long; leaflet blades ovate to obovate, rounded and subemarginate at the base, subacuminate, the tip acute and long-mucronate, sparsely villous above, slightly lustrous, the costa prominent and densely hairy and the veins delicate and impressed, brownish and sparsely villous beneath, with the nervation very prominent and the costa and veins hairy, the margin thickly hairy; blades of the lowest pair about 5 cm. long, 2 cm. broad, those of the penultimate pair larger than those of the terminal one, 13 to 15 cm. long, 5 cm. broad.

Inflorescences axillary, ternate, the peduncles and rachis ferruginous-hairy, the former 2.5 to 3 cm. long, the flower heads dense, elongate (about 3 cm. long); flowers sessile; bractlets linear, acute, a little shorter than or equal to the calyx; calyx broad, tubular, sparsely hairy, 3.2 to 3.7 (3.5) mm. long; corolla tubular-campanulate, white, sparsely silky-villous, 6.4 to 7.3 (6.8) mm. long; staminal tube included; pistil about 13 mm. long, glabrous, the ovary subsessile, containing about 20 biseriate ovules, the style ending in a broad stigma.

Legume not known.

Type in the U. S. National Herbarium, no. 530548, collected on the eastern watershed of the Western Cordillera, Cauca Valley, Colombia, flowers, November 11, 1899, by E. Langlassé (no. 63).

The tree is cultivated and is known among the natives by the name of "navo." The fruit is edible.

This species is conspicuous for its flowers, which are the smallest in the group, the hairy fringe of its leaflets, and its comparatively large stigmas. It does not come very near any of the species I have seen.

***Inga mollifoliola* Pittier, sp. nov.**

A tree; branchlets terete, glabrous, covered with brownish lenticels, the younger parts softly ferruginous-tomentose.

¹Trans. Linn. Soc. 30: 643. 1875.

Rachis of the leaves very narrowly winged, densely ferruginous-tomentose, 4.5 to 9.5 cm. long, the petiolar part nude, terete, 1 to 1.7 cm. long, the first interfolliar part nude or seminude; stipules lanceolate, acute, sparsely hairy, about 5 mm. long, caducous; leaflets 4 or 5-jugate, seldom 3-jugate, oblique, very shortly petiolulate, membranous; glands small, sessile, scutellate or cup-shaped, often obsolete; leaflet blades elliptic-ovate, obovate, or elliptic-oblong, narrow and more or less rounded at the base, acuminate at the apex, glabrous and lustrous above, the costa more or less hairy and subprominent and the veins impressed, softly ferruginous-tomentose beneath, the costa and veins densely hairy and prominent; blades of the basal pair 3.5 to 4.5 cm. long, 1.2 to 2 cm. broad, those of the terminal pair 8 to 12 cm. long, 3.5 to 4 cm. broad.

Inflorescences mostly terminal, the floral spikes single or 2 or 3-clustered in the axils of the upper leaves; peduncles densely ferruginous-pubescent, 2.5 to 4.5 cm. long; flower heads ovoid; flowers sessile; bractlets linear-subulate, hairy, 3 to 4 mm. long, subpersistent; calyx tubular, more or less stipitate, 5 to 6 (5.4) mm. long, covered with a coarse pubescence, this dense at the base, sparser toward the apex, the teeth short and rounded; corolla tubular, slightly widening toward the apex, 8.6 to 9.7 (8.9) mm. long, villous, the lobes lanceolate, obtuse, about 2 mm. long; staminal tube included, the tube and filaments pink; style clavate at the apex, longer than the stamens.

Legume not known.

Type in the John Donnell Smith Herbarium, collected at Rodeo de Pacaca, near San José, Costa Rica, in woods, flowers, January, 1891, by H. Pittier (Inst. Fís. Geogr. Costa Rica, no. 3251).

Also collected at San Marcos de Dota, in forests, flowers, March, 1893, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 7548).

Identified with *Inga densiflora* Benth. by Micheli, but differing from that Peruvian species in the tomentose indumentum, in the size, shape, and texture of the leaflets, and in the arrangement of the inflorescence, as well as in the minor details of the flowers.

***Inga monticola* Pittier, sp. nov.**

PLATE 96.

A widely spreading tree, about 16 meters high (Williams); branchlets terete, pubescent, covered with round, whitish lenticels, the younger parts ferruginous-pubescent.

Rachis of the leaves very narrowly winged, ferruginous-pubescent, 5.5 to 10 cm. long, the petiolar part 0.7 to 1 cm. long; stipules unknown; leaflets mostly 4-jugate, seldom 3-jugate, oblique, membranous, short-petiolulate; glands large, sessile, subpeltate, orbicular; petiolules ferruginous-pubescent, 1 mm. long or less; leaflet blades ovate, oblong, or ovate-elliptic, more or less rounded at the base, acute or abruptly short-acuminate at the apex, glabrous and lustrous above except on the pubescent, prominent costa and veins, glabrous or sparsely hairy and reticulate beneath, the venation here pubescent and strongly prominent, the blades of the basal pair 4 to 5 cm. long, 1.5 to 2.5 cm. broad, those of the terminal pair 8 to 14.5 cm. long, 3 to 5.5 cm. broad.

Floral spikes single in the axils of the upper leaves; peduncles 3 to 4 cm. long, ferruginous-pubescent; flower heads elongate (2 to 3.5 cm. long), depauperate; flowers sessile; bractlets linear or subulate, 1 to 3 mm. long, pubescent, subpersistent; calyx tubular, substriate, sparsely puberulent, 4.1 to 4.3 mm. long; corolla 7 to 8 mm. long, tubular, the upper half subcampanulate, minutely pubescent, the lobes lanceolate, acute, reflexed, about 1.5 mm. long; staminal tube included.

Legume sessile, 8 to 16 cm. long, rounded or subcuneate at the base, acuminate at the apex, the valves 5 cm. broad, blackish, transversely grooved, at



FRUIT OF *INGA MONTICOLA* PITTIER.



INGA DENSIFLORA BENTH.

first ferruginous-pubescent, becoming glabrous and lustrous, the margin 7 mm. broad, slightly elevated around the valves, more or less ferruginous-pubescent; seeds 5 to 10.

Type in the U. S. National Herbarium, no. 678053, collected at Bismarck, above Penonomé, Province of Coclé, Panama, flowers and fruits, March 6, 1908, by R. S. Williams (no. 316).

In its dimensions the fruit of this species recalls that of *Inga densiflora* Benth., illustrated in plate 97, but this seems to be the only common character between the two types, the former apparently having no close ally among the known species of the series *Pilosiusculae*.

EXPLANATION OF PLATES 96, 97.—Pl. 96, fruit of the type specimen of *Inga monticola*. Pl. 97, specimen of the type collection of *Inga densiflora* in the Gray Herbarium, collected near Tarapoto, eastern Peru, 1855-56, by R. Spruce (no. 4504). Both natural size.

***Inga organensis* Pittier, sp. nov.**

Young branchlets densely ferruginous-hairy.

Rachis of the leaves winged, densely ferruginous-hairy, 10 to 12 cm. long, the wings more or less attenuate toward the base, 5 to 12 mm. long, the petiolar part (also winged) 2 to 2.5 cm. long; stipules unknown; leaflets 4-jugate, subcoriaceous, petiolulate; glands small, suburceolate; petiolules densely ferruginous-pubescent, about 3 mm. long; leaflet blades ovate to elliptic-oblong, slightly attenuate and obtuse at the base, short-acuminate and mucronulate at the tip, dull above, paler and reticulate beneath, the costa and veins ferruginous-pubescent on both sides and prominent beneath, the blades of the basal pair 3 to 5 cm. long, 1.2 to 2 cm. broad, those of the terminal pair 11 to 12 cm. long, 4 to 4.5 cm. broad.

Floral spikes 2 or 3-clustered in the upper axils, the peduncles densely ferruginous-hairy, 2 to 2.5 cm. long, the flower heads ovoid; flowers sessile; bractlets linear, pubescent, 6 mm. long or less, caducous; calyx 1.5 to 2.1 (1.8) mm. long, broad, densely fulvous-pubescent, the teeth short, acute, parted by rounded sinuses; corolla 4.7 to 5 (4.9) mm. long, white, broadened above the calyx, densely silky-pubescent, the lobes triangular, subacute; staminal tube exerted; style much longer than the stamens.

Legume not known.

Type in the Gray Herbarium, collected in the Organ Mountains, Brazil; further data not given.

In this species, which is certainly not included in Bentham's last revision and seems not to have been described since, the flowers are even smaller than in *Inga chartacea*. It possibly belongs near *I. densiflora*.

***Inga sordida* Pittier, sp. nov.**

A tree; branchlets terete, the younger parts densely ferruginous-tomentellous.

Rachis of the leaves ferruginous-tomentellous, winged, 8.5 to 17 cm. long, the petiolar part 2 to 2.5 cm. long, winged, the wings attenuate toward the base and the apex, 8 to 15 mm. broad; stipules unknown; leaflets 3 or 4-jugate, coriaceous, subsessile; glands rather large, subsessile, crateriform; leaflet blades ovate or oblong, broadly rounded and emarginate at the base, acuminate at the apex, glabrous, sordid brown and lustrous above, softly pubescent and reticulate beneath, the costa pubescent and prominent and the veins impressed on the upper face, the costa and veins densely hairy and strongly prominent on the lower face; blades of the basal pair 5 to 9 cm. long, 1.5 to 3.5 cm. broad, those of the terminal pair 16 to 18 cm. long, 6.5 to 7 cm. broad.

Floral spikes paniculate at the ends of the branchlets or on short, axillary, defoliate branchlets, the peduncles densely ferruginous-tomentellous, 2 to 2.5 cm. long, the flower heads elongate and very dense; flowers sessile; bractlets

ovate-lanceolate, obtuse, hairy, about 6 mm. long, deciduous; calyx 3.7 to 4.6 (4) mm. long, tubular, sparsely pubescent, the teeth broad, rounded, 1 to 2 mm. long; corolla 8.5 to 10 (9.2) mm. long, tubular, slightly broader at the apex, densely villosulous, the lobes acute, 2 to 3 mm. long; staminal tube included; style longer than the stamens, ending in a subpeltate stigma.

Legume not known.

Type in the John Donnell Smith Herbarium, collected near Popayán, Cauca, Colombia, at an altitude of 1,700 meters, flowers, August 28, 1881, by F. C. Lehmann (no. 904).

Perhaps nearly related to *Inga densiflora* Benth., from which it differs in having the leaves larger, broader, and thicker, the pubescence more abundant, the floral spikes longer, the flowers more numerous, etc.

Inga stenopoda Pittier, sp. nov.

PLATE 98.

A tree; branchlets terete or subangulate, glabrous or very sparsely ferruginous-hairy.

Rachis of the leaves winged, sparsely ferruginous-hairy, 7 to 15 cm. long, the petiolar part nude, terete, 1 to 2 cm. long, the wings about 7 mm. broad, attenuate toward the base, rounded at the apex; leaflets 5-jugate, petiolulate, subcoriaceous; glands sessile, prominent, semiglobose, transversely compressed; petiolules densely ferruginous-hairy, 2 to 3 mm. long; leaflet blades ovate-elliptic, more or less narrowed and rounded at the base, short-acuminate at the apex, glabrous and sublustrous above, rusty-colored and sparsely covered with minute hairs beneath, the costa and veins more or less ferruginous-pubescent, slightly prominent above, strongly so beneath; blades of the basal pair 3.5 to 4.5 cm. long, 1.5 to 1.7 cm. broad, those of the terminal pair largest, 7 to 10.5 cm. long, 3 to 4.5 cm. broad.

Floral spikes 2 to 4-clustered in the axils of the upper leaves or at the defoliate ends of the branchlets; peduncles minutely ferruginous-hairy, 1.5 to 2.5 cm. long; flower heads ovoid, the flowers sessile, the lower ones deciduous; bractlets ovate-oblong, pubescent without, about 6 mm. long, caducous; calyx tubular, striate, minutely pubescent, 5.3 to 5.6 (5.4) mm. long, the teeth long and acute; corolla tubular-campanulate, 11.3 to 12.6 (12.1) mm. long, silky-pubescent, the lobes ovate, acute, 2.5 to 3 mm. long; staminal tube included.

Legume (specimen genuine?) entirely glabrous, long-pedicellate (3 cm.), rounded-cuneate at the base, the valves 1.1 cm. broad, the margin narrow and effaced.

Type in the U. S. National Herbarium, no. 32668, collected at the junction of Río Beni and Río Madre de Dios, Bolivia, flowers (and fruits?), August, 1886, by H. H. Rusby (no. 995).

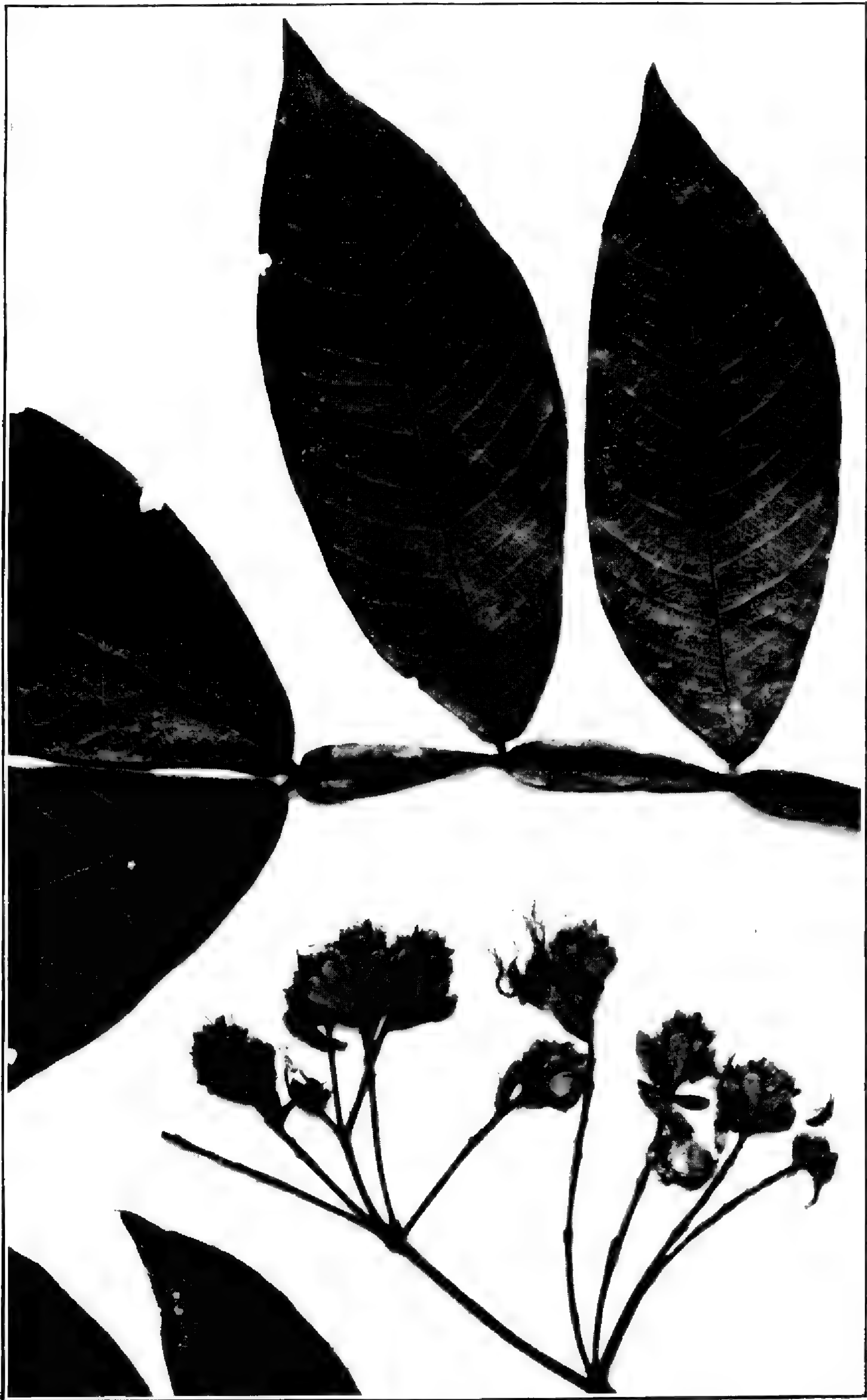
The detached basal portion of the legume accompanying the specimen in the Field Museum Herbarium and described above may belong to another genus. The affinities of this species seem to be with *Inga virescens* Benth., which I have not seen.

EXPLANATION OF PLATE 98.—From the type specimen of *Inga stenopoda*. Natural size.

Inga tuerckheimii Pittier, sp. nov.

A tree; branchlets subangulate, covered with numerous white lenticels, the younger parts ferruginous-pubescent.

Rachis of the leaves ferruginous-pubescent, winged, 3.5 to 6 cm. long, the wings 4 to 9 mm. broad, the petiolar part wingless, thickening toward the base, 1 to 2 cm. long; stipules not seen; glands small, substipitate, laterally compressed, pertuse; leaflets 3-jugate, petiolulate, suboblique, coriaceous; petiolules



INGA STENOPODA PITTIER

about 3 mm. long, ferruginous-pubescent; leaflet blades ovate, oblong, or ovate-lanceolate, broadly rounded at the base, acute at the apex, sparsely pubescent or glabrescent above, with the costa and impressed veins ferruginous-pubescent, fulvous-tomentose and reticulate beneath, with the densely pubescent costa and veins very prominent; blades of the basal pair of leaflets 2.5 to 4.5 cm. long, 1.2 to 2 cm. broad, those of the terminal pair 5.5 to 11 cm. long, 2.5 to 5.5 cm. broad.

Floral spikes 4 or 5-clustered and paniculate in the upper axils; peduncles ferruginous-pubescent, 1 to 2 cm. long; flower heads ovoid; bractlets ovate-lanceolate, acute, 3 to 5 mm. long, pubescent, caducous; flowers sessile; calyx tubular, densely ferruginous-pubescent, 5.5 to 6.5 mm. long, the teeth 1.5 to 2 mm. long; corolla tubular, broadening to the apex, ferruginous-pubescent, 12 to 14.5 mm. long, the lobes lanceolate, acute, 1.5 to 2 mm. long; staminal tube included; pistil about 6 cm. long, exceeding the stamens; ovary compressed, sessile.

Legume not known.

Type in the John Donnell Smith Herbarium, collected at Cobán, Alta Verapaz, Guatemala, at an altitude of 1,450 meters, flowers, April, 1887, by H. von Türckheim (J. D. Smith, no. 1214).

Distributed under the name *Inga edulis* Mart., with which, however, it has no close affinity. It takes its place near *I. hayesii* on account of its 3-jugate leaflets and short floral spikes, but it seems to be more closely related to *I. micheliana* and *I. pringlei*.

CRITICAL NOTES.

The series *Pilosiusculae* and *Leptanthae* appear to be distinguished from each other only by artificial and somewhat arbitrary characters. In the first series the bracts are said to be "small or caducous," which may be understood as if they were either small and then persistent or larger and then deciduous. As a matter of fact, in all the species that have come under my observation these bracts, either small or large, were found to be caducous or at the most, in a few isolated cases, to remain on the stalk only for a short time after the fall of the flower. In *I. leptantha* these bracts seem to be indefinitely persistent, and much longer than the calyx.

Inga micheliana, *I. pringlei*, and *I. mollifoliola* evidently form by themselves a natural group, characterized by the small, 4 or 5-jugate leaflets. In the last two the size of the flowers is practically the same, and to distinguish the two former from each other it is necessary to compare details which are not especially obvious at first glance. This group, furthermore, corresponds to the definition of the *Pilosiusculae* and should be considered as part of this series. It is difficult to understand how *I. micheliana* could be compared by Dr. Harms with *I. vestita* Benth., a *Vulpina* from southern Brazil with nude foliar rachis and very distinct flowers, while the closely related *I. pringlei* is brought near to *I. striata*, although its bracts are cadu-

cous or at the most only subpersistent. The knowledge of the fruit in these three species will certainly help very much in the definition of their relationship and true affinities, but meanwhile they should be placed side by side among the *Pilosiusculae*. A Guatemalan specimen of *I. micheliana* is illustrated in plate 99.

During my last stay in Panama, I collected specimens of a small tree closely corresponding to the description of *Inga hayesii* Benth. The supposition of its being this species was confirmed later by a comparison with the type at Kew. The fruit of this species is not yet known, but a full description of the leaves and flowers is now given.

Inga hayesii Benth. Trans. Linn. Soc. 30: 617. 1875.

A small tree; branchlets terete, with a reddish, lenticellose bark; young shoots more or less brownish-villous.

Leaves light green above, paler beneath; rachis 5 to 11.5 cm. long, sparsely hairy, winged (the wings 7 to 10 mm. broad); stipules obovate, obtuse, densely pubescent without, strongly veined within, 3 to 4 mm. long, deciduous; leaflets 2 or 3-jugate, short-petiolulate; glands small, subsessile, brownish, with a dark pit; petiolules pubescent, about 1 mm. long; leaflet blades ovate to lanceolate, rounded and subemarginate at the base, obtuse or acute and apiculate at the tip, glabrous excepting the sparsely hairy costa, reticulate on both faces, the costa and veins more prominent beneath, the blades of the basal pair 3.5 to 7 cm. long, 1.7 to 4 cm. broad, those of the terminal pair 7 to 14 cm. long, 3.5 to 6 cm. broad.

Inflorescences axillary, single or geminate, very shortly pedunculate; peduncles and rachis strigose-hairy, the former 3 to 5 mm. long, the latter 10 to 15 mm. long; bractlets lanceolate, acute, pubescent without, about 2 mm. long, deciduous; flowers sessile; calyx 6.7 to 8.2 (7.4) mm. long, tubular but slightly broadening toward the tip, glabrous or sparsely hairy at the base, striate, the teeth irregular, acute, minutely pubescent at the tips; corolla tubular-funnelform, white, villous, 15.8 to 16.6 (16.3) mm. long, the lobes narrow, acute, 3.5 to 4 mm. long; staminal tube included; ovary sessile, glabrous, very short, deeply sulcate on both sides, 6-ovulate; style about 4 cm. long, equaling the stamens, the stigma capitellate.

Legume not known.

PANAMA: Panama, *Hayes*. Hills around the agricultural experiment station at Matías Hernández, near Old Panama, flowers, July 10, 1914, *Pittier* 6714.

This species is characterized by its glabrous or almost glabrous calyx, in appearance not unlike that of *Inga longipes* Benth. and *I. hirsutissima* Rusby, and by its almost sessile spikes. The type has been wrongly compared with *I. maritima* Benth., which is illustrated in plate 100.

EXPLANATION OF PLATE 99.—Specimen of the type collection of *Inga micheliana* Harms, in the Gray Herbarium, collected at Río Negro, Department of Quiché, Guatemala, altitude about 1,080 meters, March, 1892, by Heyde and Lux (J. D. Smith, no. 3319). Natural size.

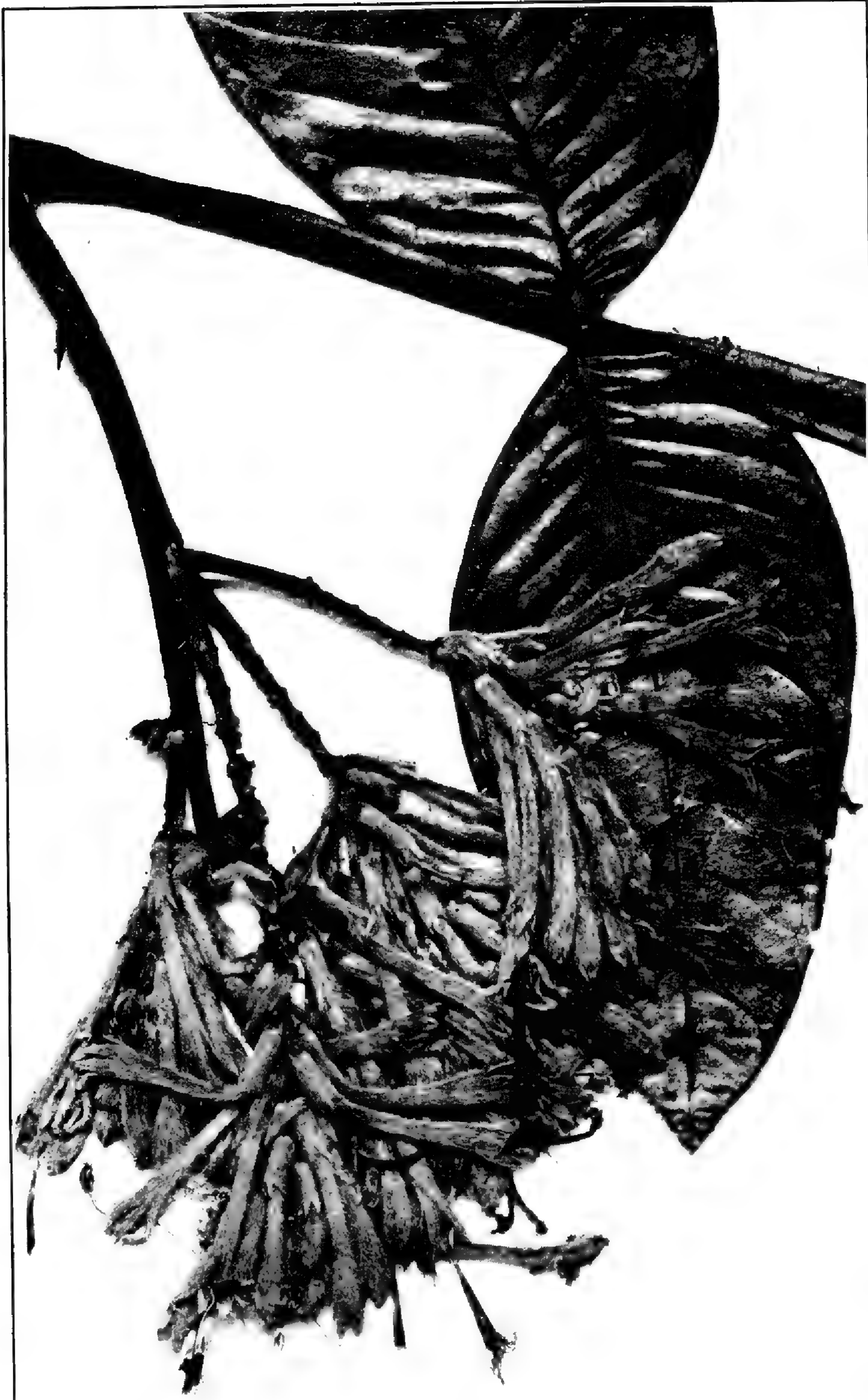
EXPLANATION OF PLATE 100.—Specimen of *Inga maritima* Benth., in U. S. National Herbarium, collected in the vicinity of Rio de Janeiro, Brazil, July, 1833, by Riedel (no. 442). Natural size.



INGA MICHELIANA HARMS.



INGA MARITIMA BENTH.



INGA LOMATOPHYLLA (BENTH.) PITTIER.

Series 4. LEPTANTHAE.

NOTES.

This small group is poorly represented in the collections at my disposal. It consists mainly of species native in the eastern and northeastern part of South America.

Inga acuminata Benth. Lond. Journ. Bot. 4: 600. 1845.

From Trinidad, this species presents in its long-pointed calyx a feature considered to be unique in the genus, but which we now find repeated in a specimen distributed by the Christiania Herbarium and purporting to have been collected by Eggers at El Recreo, Ecuador, April 27, 1897. It must be stated, however, that Baron Eggers also collected in Trinidad, and that the specimen referred to, in the Field Museum, is not numbered, so that there is the possibility of a label having been transposed. The two leaves on the specimen are 1-jugate, but all other details agree with Bentham's description of the Trinidad plant.

Inga hartii Urban is transferred to series 6, Calocephalae.

Series 5. LONGIFLORAE.

CRITICAL NOTES.

Bentham and Spruce considered no. 3097 of the latter's collection to be merely a variety of *Inga speciosa* Spruce, a view that is not justified by the comparison of the specimens. Bentham's variety *lomatophylla*, accordingly, is below given specific rank.

Inga speciosa Spruce, Trans. Linn. Soc. Bot. 30: 620. 1875.

In *I. speciosa* the leaflet pairs are close together, with the intermediate wings correspondingly short; the leaflets themselves are smaller (than in *I. lomatophylla*), sparsely pilosulous beneath with the costa and veins slender and sparsely hairy; the inflorescences, although of the same type as to their arrangement as in the so-called variety, are more slender and borne on a long, bracteate common peduncle; in the flower, the calyx measures from 8.5 to 9.5 mm., with teeth 1.5 to 2 mm. long, and the corolla is 32.5 to 34 mm., the lobes 3.5 to 4 mm. long; lastly, the staminal tube is very slender and exceptionally long-exserted, measuring nearly 6 cm. from the base.

Inga lomatophylla (Benth.) Pittier.

PLATE 101.

Inga speciosa lomatophylla Benth. Trans. Linn. Soc. 30: 620. 1875.

In Spruce's no. 3097, now accepted as the basis of a species, the distinctive features, as compared with *I. speciosa* are:

Rachis of the leaves more elongate, the leaflet pairs more distant with the corresponding modification of the wings; leaflets reticulate, coarser, and twice as large as in *I. speciosa*, with the costa and veins much stronger and the indument much more dense; common peduncles of the fasciculate spikes shorter and thick; flowers also sensibly larger, the calyx measuring 11 to 11.5 mm., the corolla 37 to 38 mm. long, and the staminal tube projecting to a less distance.

These differences are sufficient, I think, to justify the elevation of the so-called variety to specific rank.

EXPLANATION OF PLATE 101.—Specimen of the type collection of *Inga lomatophylla*, in the Gray Herbarium, collected near San Carlos, upon the Rio Negro, northern Brazil, 1853-54, by R. Spruce (no. 3097). Natural size.

Inga mucuna Walp. & Duchass., reduced to *I. lindeniana* by Benthham, is evidently a distinct species, related perhaps to *I. poeppigiana* from Peru, which I have not seen, but from which it differs in having 4 instead of 3 pairs of leaflets, while the spikes, instead of being sessile, are long-pedunculate. The specimen in the Gray Herbarium is evidently part of the type collection. It has the broadly ovate leaflets, abruptly contracted into a linear acumen, a character given as specific in the original description but not apparent in our specimens; these, however, agree exactly in the dimensions of the flowers and in the particulars of the fruits. If the synonymy given by Benthham were exact, Walpers's name would have the priority, but the two species are quite distinct. In *I. mucuna* the calyx is $9\frac{1}{2}$ and not 5 to 8 lines long, and the corolla $22\frac{1}{3}$ lines, i. e. nearly 2 inches, and not almost 1 inch long.

The bractlets of *Inga mucuna* can hardly be said to be persistent, for which reason it takes its place with the Longiflorae. The description is as follows:

Inga mucuna Walp. & Duchass. Walp. Ann. Bot. 2: 459. 1851-52.

A middle-sized tree with spreading crown; branchlets angulate, the bark brownish, lenticellate, the young shoots densely ferruginous-hairy.

Rachis of the leaves winged, densely covered with light brown or golden brown strigose hairs, 11 to 22 cm. long, the petiolar part nude or narrowly winged, 2.5 to 3.5 cm. long, the wings broad (1.7 to 3.5 cm.), attenuate or long-cuneate toward the base, rounded at the tip, distinctly veined transversely, the pubescence as in the blades; stipules cordiform, acute, persistent, 5 to 8 mm. long; leaflets 2 to 4-jugate, membranous, petiolulate; glands very small, subsessile, brownish, with a dark pit; petiolules about 3 mm. long, very hairy; leaflet blades ovate-orbicular to ovate, broadly rounded at the base, usually acute at the apex but sometimes abruptly contracted into a narrow, long-mucronate acumen, dull and strigose above except on the densely hairy costa, tomentose-pubescent beneath, with the densely hairy costa and veins prominent; leaflet blades of the basal pair 6 to 11.5 cm. long, 4 to 5 cm. broad, those of the terminal pair 10 to 17.5 cm. long, 6.5 to 11 cm. broad.

Inflorescences axillary, single, long-pedunculate; peduncles 5 to 8 cm. long, densely light brown hairy like the rachis; flower heads dense, 3 to 4 cm. long; flowers sessile; bractlets elliptic, acute, densely hairy, about 6 mm. long, caducous; calyx tubular, striate, 2 cm. long, glabrous except on the tips of the short teeth; corolla long-tubular, slightly broadened at the apex, white and white-villous, 4.5 to 5 cm. long, the lobes narrow, not over 7 mm. long; staminal tube slender, long-exserted (nearly 6 cm. long); pistil about 12 cm. long; ovary sessile, about 5 mm. long; stigma capitellate, flattened at the apex.

Legume spirally twisted, rarely plane, sessile, up to 30 cm. long, 5 cm. broad, rounded at the base, obtuse at the apex, densely ferruginous-strigose, the margins rounded and deeply sulcate along the line of dehiscence; seeds numerous.

PANAMA: Panama, 1850, *Duchassaing* (type). Banks of the Sambú River, southern Darién, near the limit of the tide, flowers and fruits, February 1, 1912, *Pittier* 5525.

The leaf and fruit specimens from the lower Orinoco, distributed by Rusby and Squires as *Inga mucuna*, seem to belong to still a third species, but in the

absence of the flowers this can not be decided at present. The conspicuous, persistent stipules would lead one to think that the bractlets also remain through anthesis, in which case the tree would range along with *I. lindeniana* among the Calocephalae.

Inga feuillei DC., renamed *I. cumingiana* by Benthams, should also take its place in this series and not, as Benthams had it, among the Euingae, from which it is excluded by its flat, narrowly marginate pods.

This species seems to be the pacai *par excellence* of the Peruvians, and it is said to be found in almost every garden at Lima. The name "pacai" is in Peru and Bolivia the popular generic name for Inga, corresponding to the "guamo" of Colombia, and "guavo" of Central America. It is used in compound nouns to designate many of the native species. Thus, *Inga feuillei* is, according to a verbal communication of Mr. O. F. Cook, the "pacai de mono" or "monkey pacai" of Santa Ana, in the Urubamba Valley.

Notwithstanding its reputation as a favorite fruit of the Peruvians the species is imperfectly known, so that the following attempt at a fuller description than those of Feuillée, de Candolle, and Benthams will not be out of place here.

Inga feuillei DC. Prodr. 2: 433. 1825.

A tree with rounded-depressed, spreading crown, the young branchlets fulvous-pubescent, covered with numerous white lenticels.

Rachis of the leaves fulvous-hairy, narrowly winged, 14 to 25 cm. long, the petiolar part wingless, 2 to 3.5 cm. long; stipules not seen, caducous; glands small, subsessile, inconspicuous; leaflets 4 or 5-jugate, oblique, coriaceous, the petiolules not over 2 mm. long, thick, fulvous-hairy, the blades oblong-elliptic, rounded at the base, acutely acuminate at the apex, reticulate, sparsely hairy or glabrescent above, the costa, veins, and venules more or less sparsely hairy beneath, the blades of the basal pair 6 to 10 cm. long, 4 cm. broad, those of the terminal pair 10 to 20 cm. long, 7 to 9 cm. broad.

Inflorescences solitary in the axils of the leaves, the peduncles stout, at first fulvous-hairy, later glabrescent, 6 to 11 cm. long; floral heads subelongate; flowers sessile; bracts linear, shorter than the calyx, subpersistent; calyx tubular, fulvous-tomentose, 8.5 to 11 mm. long, persistent, the teeth short, acute; corolla fulvous-hairy, silky, 17 to 19 mm. long; stamens not seen.

Legume flat, 30 to 65 cm. long, at first densely rufous-pubescent, the margins rufous-hairy, dilatate, and obscurely bisulcate.

PERU: Lima, *Feuillée*, *Cuming* 980, etc. Santa Ana, alt. about 900 meters, young fruits, June 29, 1914, *Cook & Gilbert* 1573.

Benthams placed this species in section Euinga, near *Inga spuria*, but it obviously does not belong there. The tree is said to be a favorite in the gardens of Lima, not only because of its shade, but also on account of the succulent, sweet pulp which surrounds the seeds.

Series 6. CALOCEPHALAE.

NEW SPECIES.

Inga goldmanii Pittier, sp. nov.

A tree 6 to 10 meters high, usually with depressed, spreading crown; branchlets angulate, the younger growth densely rufous-hairy.

Rachis of the leaves rufous-hairy, winged, 9 to 25 cm. long, the wings 0.8 to 2 cm. broad, sparsely hairy, the petiolar part (also winged) 2 to 4 cm. long; stipules cordate, obtuse, about 1.5 cm. long and 1.2 cm. broad, minutely hairy; leaflets 3 or 4-jugate, coriaceous, subsessile; glands sessile, with a supernumerary one on the costa of each leaflet in the leaves of the seedlings, distinctly stipitate, occurring only on the main rachis in the adult leaves; leaflet blades oblique, ovate or oblong, rounded and subemarginate at the base, obtuse or acute at the apex, sparsely villous and sublustrous above, with the veins and hairy costa deeply impressed, dull and glabrous beneath excepting the sparsely hairy and strongly prominent venation, the blades of the lower pair 7 to 12 cm. long, 5 to 6 cm. broad, those of the terminal pair 17 to 20 cm. long, 9 to 11 cm. broad.

Inflorescences axillary, long-pedunculate, the peduncles densely rufous-hairy; flowers sessile; calyx 14 mm. long, densely fulvous-pubescent without, glabrous within; corolla tubular, densely fulvous-tomentose without, glabrous within, 25 mm. long, the lobes 8 mm. long, narrow, acute; staminal tube included; pistil about 5.5 cm. long, the ovary glabrous, the style capillary and scarcely thickened at the apex.

Legume flat or spirally twisted, sessile, long-stipitate (the stipe angular, about 2 cm. long), rounded or subacute at the apex, 20 cm. long or more, 3.5 to 4.3 cm. broad, densely rufous-hispid, the margin rounded, deeply sulcate on the sutural line.

Type in the U. S. National Herbarium, no. 690303, collected near Gatún, Canal Zone, Panama, fruits (with the persistent remnants of the flowers), February 10, 1911, by E. A. Goldman (no. 1866).

COSTA RICA: Banana River, near Port Limón, in forest, a seedling leaf only, May 1, 1903, *Cook & Doyle* 429. Río Hondo, plains of Santa Clara, fruits, May, 1902, *Pittier* (Inst. Fís. Geogr. Costa Rica, no. 16376). Xirores, Talamanca, on forest border, fruits, February, 1895, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 9358).

Supposed to be very closely related to *Inga lindeniana* Benth., from Mexico, which I have not seen, but the leaflets are oftener 4-jugate, are coriaceous and not membranous, and are not hirsute above and velvety beneath. In the original description of the Mexican species the calyx is stated to be 5 lines (10.6 mm.) long; that is to say, a little shorter than in our species, while in the Revision of 1875 the scale has been extended ("5 to 8 lines"), probably so as to include the Panama specimens cited. The calyx of *I. lindeniana*, however, is striate and pilosulous, thus a decided departure from that of *I. goldmanii*. Lastly, the pods of the former species are stated to be 1 to 1½ inches or 5 to 6.5 cm. broad, while in the latter they do not exceed 4.5 cm. Of the Panama specimens cited by Bentham the one collected by Duchassaing is the type of the very distinct *I. mucuna*; the other may belong under *I. goldmanii*.

An interesting feature of *I. goldmanii* is the presence of supernumerary glands or nectaries on the leaflets of the leaves taken from very young trees. These extrafloral nectaries are situated on the costa, at a distance of about 2 cm. from the one on the rachis. It may be mentioned here that the nature and functions of these glandular formations, as especially connected with the genus *Inga*, have never been investigated.

Inga purpusii Pittier, sp. nov.

A tree; young branchlets angulate, fulvous or brownish-hairy, covered with roundish, white lenticels.

Rachis of the leaves densely hairy, 10 to 13.5 cm. long, narrowly winged between the two upper leaflet pairs, terete or submarginate between the basal and middle pair, the petiolar part 5 to 5.5 cm. long, terete; stipules ovate or oblong, obtuse, densely pubescent, 7 to 10 mm. long, subpersistent; leaflets 2 or 3-jugate, short-petiolulate, membranous, suboblique; glands very small and subsessile or obsolete; petiolules densely hairy, about 1 mm. long; leaflet blades ovate to oblong, more or less narrowed or broadly rounded at the base, acute or short-acuminate at the apex, sparsely hairy, reticulate, and lustrous above, paler, reticulate, and hairy beneath, the costa and veins more or less pubescent and prominent on both faces, the blades of the basal pair about 10 cm. long, 5 cm. broad, those of the terminal pair 13 to 18 cm. long, 7.5 to 9 cm. broad.

Inflorescences axillary or terminal, the peduncles densely ferruginous-hairy, 3 to 5 cm. long, the flower heads elongate (up to 8 cm. long); flowers sessile; bractlets linear, hairy on both faces, 2 to 2.5 cm. long, persistent; calyx tubular, acute at the base, striate, sparsely and minutely hairy, 16.9 to 20 (18.9) mm. long, the teeth very narrow, 4 to 6 mm. long; corolla tubular, broadening toward the apex, 29 to 32 (30.4) mm. long, villous, the lobes rather broad, 2 to 3.5 mm. long; staminal tube included or very shortly exserted, the filaments purple and very long (6.5 to 7 cm. from the base of the tube), the pistil 7 to 7.5 cm. long, the stigma clavate.

Legume (immature?) about 30 cm. long, 2.7 cm. broad, thin, rounded at the base, long-apiculate, glabrous, the margin thick, rounded, slightly elevated around the valves.

Type in the Herbarium of the New York Botanical Garden, collected at Finca Yolanda, Chiapas, Mexico, flowers and fruits, September, 1913, by C. A. Purpus (no. 6811).

The specimen described is not very satisfactory, the leaves being few and badly pressed and the floral spikes all detached. The plant is very distinct from *Inga panamensis* Seem., the leaflets being differently shaped and very hairy, the flowers much larger, and the legume narrower and with a less prominent margin.

DESCRIPTIONS OF TWO OLD SPECIES WITH NOTES.

Inga spectabilis Willd., first mentioned and summarily characterized and figured by Vahl as a *Mimosa* species, has never been fully described under its present name. Kunth appears to have ignored Willdenow's mention and divided the species into two distinct types, *I. lucida*¹ and *I. fulgens*,² which, however, seem to differ only in the shape of the leaflets.

Of *Inga panamensis* we have only the short diagnosis in Bentham's revision. It will not be outside the scope of the present paper, then, to give full descriptions of both species.

¹ In H. B. K. Nov. Gen. & Sp. 6: 287. 1823.

² Mimos. Pl. Légum. 36. pl. 11. 1819-1824.

Inga spectabilis (Vahl) Willd. Sp. Pl. 4: 1017. 1806.

Mimosa spectabilis Vahl, Skrivt. Naturhist. Selsk. (Kjøbenhavn) 2¹: 219. pl. 10. 1792.

A medium-sized tree with rounded crown; branchlets pubescent or glabrous, angular.

Leaves glabrous or glabrescent, the rachis marginate or narrowly winged below each pair of leaflets, terete and nude above them, 3.5 to 10 cm. long, the petiolar part 0.8 to 2 cm. long; stipules narrow-lanceolate or linear, acute, persistent, 6 to 12 mm. long; leaflets 1 to 3-jugate, sessile or almost so, coriaceous, bullate; glands large, sessile, salver-shaped; blades oblique, broadly ovate to obovate, rounded or attenuate toward the base and emarginate on the broader side, obtuse or subacute and often mucronate at the apex, dark green and lustrous above, with the costa prominent and minutely pubescent and the veins deeply impressed, beneath light green, with the costa, veins, and venules strongly prominent, the blades of the basal pair 8 to 19 cm. long, 5 to 10 cm. broad, those of the terminal pair 15 to 26 cm. long, 8 to 14 cm. broad.

Inflorescences paniculate and terminal; peduncles stout, 2.5 to 4 cm. long, minutely brownish-pubescent; flower heads dense, elongate, the rachis minutely pubescent, 3 to 4 cm. long; flowers sessile; bractlets ovate-lanceolate, pubescent without and within, shorter or longer than the calyx; calyx broad, irregularly cleft at the tip, minutely pubescent outside and inside, 7 to 8 mm. long; corolla tubular, broadening toward the tip, silky-villous, 18 mm. long, the lobes narrow, about 5 mm. long; staminal tube included; style subcapitellate.

Legume glabrous, 30 to 60 cm. long, about 7 cm. broad, and 2.5 to 3 cm. thick, the margins rounded and smooth, the apex obtuse; seeds 7 to 16 or more, immersed in an insipid white pulp.

The type material was from Santa Marta, Colombia.

COSTA RICA: Turrialba, flowers, November, 1893, *Tonduz*; October, 1894, *Pittier* (Inst. Fís. Geogr. Costa Rica, nos. 8333, 9041). Talamanca, *Pittier*. Boruca, fruits, February, 1891, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 4765). Buenos Aires, Diquís Basin, fruits, February, 1891, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 3826).

PANAMA: Chagres, January, 1850, *Fendler*. Matachín, Canal Zone, *Otto Kuntze* 1923. Hospital Grounds at Ancón, Canal Zone, fruits, March, 1910, *Chas. F. Mason*. Around Culebra, Canal Zone, leaves only, January 15, 1911, *Pittier* 2423. Between Las Cascadas and Bas Obispo, Canal Zone, flowers, July 1, 1911, *Pittier* 3746. Bismarck, above Penonomé, Province of Coclé, fruits, March, 1908, *Williams* 383, 584.

This tree is sometimes cultivated on account of the edible pulp contained in its enormous pods, but there is no doubt as to its being indigenous in Panama and Costa Rica. A leaf collected in the vicinity of Sepacuité, Alta Verapaz, Guatemala, by Cook and Griggs may also belong to this species.

Bentham's statement that the corolla is "subpollicaris"—almost an inch long—does not hold with our specimens, in which that part of the flower is only 18 mm., that is to say, 8½ lines long. The other discrepancies have already been mentioned by Seemann in the Voyage of the Herald.

Inga panamensis Seem. Bot. Voy. Herald 117. 1853.

A small tree; branchlets terete, slender, the younger parts sparsely light brown hairy.

Rachis of the leaves also light brown hairy, very narrowly winged, 4 to 8 cm. long, the petiolar part 3.5 to 6 cm. long; stipules ovate, acute, 6 to 9 mm. long, 4 mm. broad, pubescent, persistent; leaflets 1 to 3-jugate, petiolulate, membranous or subcoriaceous; glands very small, sessile; petiolules 4 mm. long, pubescent; blades ovate to obovate, rounded at the base, obtuse and often

mucronate at the apex, glabrescent on both sides, the costa, veins, and venules more or less hairy and prominent beneath, the blades of the inferior pair 7.5 to 10 cm. long, 4.5 to 5 cm. broad, those of the terminal pair 13 to 15 cm. long, 8 to 9.7 cm. broad.

Inflorescences single, axillary or terminal; peduncles angulate, striate, 1.5 to 3.5 cm. long, sparsely hairy; flower heads ovoid, the rachis 1.5 to 2.5 cm. long; flowers sessile; bractlets linear, acute, hairy, 1 to 1.5 cm. long, persistent; calyx broad, irregularly cleft, sparsely hairy, 7 to 8 mm. long; corolla tubular, broadened at the tip, silky-pubescent, 13 to 15 mm. long, the lobes short and broad.

Legume (fide Benth) glabrous, thick, 15 cm. long and over, 3.8 cm. broad, the margins very prominent.

PANAMA: Near Cruces, Canal Zone, in woods, *Seemann* 407 (specimen of the type collection in the Gray Herbarium). Bismarck, above Penonomé, Province of Coclé, leaves only, March 19, 1908, *Williams* 589.

My measurements of the flowers are slightly less than those given by Benth. The calyx, like that of *Inga spectabilis*, does not seem to open by 5 short teeth, as in most species, but to burst irregularly under the pressure of the growing corolla. I have not collected this species or seen the fruit.

Inga panamensis strikingly resembles *I. pittieri* Micheli, of the section Euinga, differing, however, in the shorter calyx and corolla and in the shape of the legume.

With reference to *I. lindeniana* Benth., the characters of the fruit were not given in the original description, and those given later may belong to a distinct species. Benth's diagnosis in the Revision seems to have been modified so as to cover several species, among them *I. mucuna* Walp. & Duchass. and probably *I. goldmanii*.

Series 7. VULPINAE.

NEW SPECIES.

Inga balaensis Pittier, sp. nov.

A tree 10 meters high (Eggers), the young branchlets densely rufous-hispid.

Rachis of the leaves narrowly winged, rufous-hispid, 10 to 11 cm. long, the petiolar part also winged from the base, 4.5 to 5.5 cm. long, the wings narrower below the basal leaflets, 6 to 8 mm. broad; stipules ovate, acuminate, 1 to 2 cm. long, 0.5 to 1 cm. broad, densely ferruginous-pubescent without, persistent; leaflets 2-jugate, more or less oblique, petiolulate, membranous; glands small, long-stipitate, the stipels hispid, 4 mm. long or less; petiolules densely hispid, 3 to 4 mm. long; leaflet blades broadly ovate, rounded, or slightly attenuate and subemarginate at the base, obtuse or abruptly short-acuminate at the apex, dull and glabrescent above, with hairy costa and veins, reticulate and glabrous beneath, with the costa and veins prominent and sparsely hairy, the blades of the basal pair 7.5 to 9 cm. long, 5 to 6 cm. broad, those of the terminal pair 11 to 17 cm. long, 7 to 10.5 cm. broad.

Floral spikes single or geminate in the axils of the upper leaves, the peduncles rufous-hispid, slender, striate, 7 to 9.5 cm. long, the flower heads loose, subelongate; bractlets linear or narrow-obovate, 4 to 8 mm. long, hairy without, deciduous; flowers sessile; calyx tubular, broadening toward the apex, 10 to 12 mm. long, striate, sparsely hairy, the teeth broad, obtuse, 3 to 4 mm. long; corolla tubular, gradually broadening to the apex, 21.5 to 23 mm. long, densely villous, the lobes acute, 2.5 to 3.5 mm. long; staminal tube included; pistil 5 to 5.5 cm. long, surpassing the stamens; ovary glabrous, depressed; stigma clavate.

Legume (immature) sessile, rounded at the base and apex, about 10 cm. long, 1.5 cm. broad, thin, densely hairy.

Type in the John Donnell Smith Herbarium, collected at El Balao, Province of Manabí, Ecuador, in forests, flowers, April, 1893, by Baron Eggers (no. 14648).

Through its pubescence and long-stipitate glands *Inga balaensis* evidently belongs to the Vulpinae, but it does not seem to be closely related to any other species of the group. The leaflets are 2-jugate, an exceptional feature recorded heretofore only in *I. guilleminiana* Benth. On the other hand, it has the broad stipules noted in *I. setosa*, *I. multicaulis*, *I. barbata*, and others. The flowers are comparable with those of certain species of the Longiflorae.

***Inga codonantha* Pittier, sp. nov.**

PLATE 102.

A tree, 10 to 12 meters high, the young branchlets, rachis of leaves, and peduncles fuliginous-hirtous.

Rachis of the leaves narrowly winged, about 9 cm. long, the petiolar part wingless, 1.5 cm. long, the wings 7 mm. long or less; stipules linear-lanceolate; glands small, subsessile, pertuse; leaflets 5-jugate, petiolulate, thick, coriaceous, the petiolules densely fuliginous-hirtous, 2 to 3 mm. long, the blades ovate, rounded at the base, acute at the apex, fuliginous-pubescent above, with the costa densely hirtous and the veins and venules impressed-reticulate, densely soft-pubescent and strongly reticulate beneath, with the hairy costa and veins very prominent; leaflets of the basal pair about 4 cm. long and 2 cm. broad, those of the terminal pair 8 to 8.5 cm. long, 3.5 to 4.5 cm. broad.

Floral spikes terminal, 2 or 3-clustered, the peduncles about 2.5 cm. long; floral buds large, globose, the bractlets absent or very small and deciduous; calyx stipitate (the stipels 2 to 4 mm. long), broadly campanulate, fuliginous-pubescent, 11 to 13 mm. long (including the stipels), the teeth ovate, 3 to 4 mm. long; corolla narrow at the base, broad at the apex, white, densely villous, 16 to 19 mm. long, the lobes broad and rounded, about 4 mm. long; staminal tube included; ovary 4-sulcate(?).

Legume not known.

Type in the U. S. National Herbarium, no. 530517, collected at Campoalegre (Cauca?), Colombia, at an altitude of 1,500 meters, flowers, November 6, 1899, by E. Langlassé (no. 27).

In the shape of the flowers and in the large globose buds *Inga codonantha* recalls *I. sessilis*, whose place among the Pseudingae seems to be with the Vulpinae. The ovary of the new species, however, is apparently 4-sulcate, and this may indicate a tetragonous fruit.

EXPLANATION OF PLATE 102.—From the type specimen of *Inga codonantha*. Natural size.

***Inga chrysotricha* Pittier, sp. nov.**

A small tree; branchlets more or less hairy, the younger growth densely covered with long, golden yellow hairs.

Rachis of the leaves hirsute, narrowly winged, 5 to 10.5 cm. long, the petiolar part nude, about 5 cm. long, the wings 1 cm. broad or less; stipules broadly ovate-cordate, acute, persistent, about 8 mm. long and 10 mm. broad, hairy without, glabrous, brownish (in sicco), and finely parallel-veined within; leaflets 4 or 5-jugate, suboblique, membranous, almost sessile (the petiolules 1 mm. or less); glands small, long-stipitate, geminate between the lower pair of leaflets; leaflet blades ovate to lanceolate, rounded at the base, short-acuminate at the apex or abruptly contracted into a subulate point, sparsely hairy or glabrescent above, the costa and veins more or less covered with long hairs, paler and sparsely hairy beneath, the costa and veins hairy and prominent, the margin ciliate; blades of the basal pair 3 to 4 cm. long, 1.1 to 1.7 cm. broad, those of the terminal pair 8.5 to 12 cm. long, 2.5 to 6 cm. broad.



INGA CODONANTHA PITTIER.

Inflorescences solitary or geminate in the axils of the leaves, the peduncles 2.5 to 7 cm. long, densely covered with long, golden yellow hairs, the flower heads short and broad; flowers sessile; bractlets ovate to lanceolate, acute, 6 to 10 mm. long, hairy without, glabrous within, striate, persistent; calyx broad, 13.7 to 16.3 (14.7) mm. long, striate, the base sparsely covered with long hairs, these denser on the linear or subulate teeth, these 4.5 to 7 mm. long; corolla tubular, slightly broadened at the apex, 18 to 22.5 (20) mm. long, villous, the lobes lanceolate, reflexed, 3 to 4.5 mm. long; staminal tube included, the filaments numerous, white or purplish; style truncate.

Legume about 22 cm. long and 4 cm. broad, flat, long-stipitate, rounded and cuspidate at the apex, densely covered with long, stiff, golden yellow hairs, the seeds (up to 20) immersed in a white, sweet pulp.

Type in the Herbarium of the New York Botanical Garden, collected at Apolo, Bolivia, at an altitude of 1,560 meters, flowers and fruits, June 28, 1902, by R. S. Williams (no. 1640).

BOLIVIA: (Besides the type) Río Juntas in coca plantation, alt. 800 meters, flowers and fruits, April 13 to 21, 1892, *Otto Kuntze*. Polo-Polo, near Coroico, Yungas del Norte, alt. 1,100 meters, flowers and fruits, October and November, 1912, *Buchtien*.

PERU: Lucumayo Valley, alt. 1,800 to 3,600 meters, flowers and young fruits, June 20, 1915, *Cook & Gilbert* 1390.

This species, said to be cultivated in Bolivia under the name of "pacay" (Williams in sched.), has been and is easily confused with *Inga hirsutissima* Rusby, of which it may be only a subspecies. The flowers, however, are much larger, the calyx of the latter having an average length of 6.9 mm., which is less than half that of the same part in *I. chrysotricha*; and besides this, the calyx teeth of *I. hirsutissima* are broad and not over 3 mm. long, while in *I. chrysotricha* they are linear or subulate, ranging from 4.5 to 7 mm. in length.

In the corolla, which is not over 16 mm. long in Rusby's species, we note also appreciable differences in the shape, that of the latter species being a near approach to true campanulate, while in the former it is simply broadened a little at the apex.

A feature not noted heretofore in *I. hirsutissima* is the presence of paired glands between the lower leaflets. In the several specimens which I have examined they were found only at the insertion of the first pair, and were often confluent, so as to form a single, transversely flattened gland. In *I. chrysotricha* they appear between the leaflets of the two basal pairs and seem to be always distinct.

With reference to *I. hirsutissima* Rusby, it is to be observed that the description is in some respects inaccurate. We note for instance that the hairs are not ferruginous but fulvous, the stipules not "cartilaginous" but at most coriaceous, the leaves not quite sessile, the rachis not 5 cm. but 5 to 10.5 cm. long, the breadth of the wings ranging from 5 to 12 mm. and not from 5 to 7, the flowering peduncles from 4.5 to 7.5 cm. and not the fixed length of 3 cm., etc. The characters of the corolla have been omitted and it would appear from the description that each flower has several styles. A better description might certainly have been drawn from any of the 5 specimens of the type number which I have examined.

Inga cookii Pittier, sp. nov.

A shrub or a small tree; branchlets, rachis of the leaves, and peduncles densely covered with long, brown, setulose hairs.

Rachis of the leaves winged (the wings sparsely hirsute, ciliate, about 6 mm. broad, extending to the base), 5 to 7.5 cm. long, the petiolar part 0.5 to 1

cm.; stipules ovate, obtuse, sparsely hirsute, 3 to 4 mm. long; leaflets 3-jugate, subsessile, membranous; glands small, orbicular, light brown, pertuse, with a dark pit, long-stipitate (stipe about 2.5 mm. long, very slender); leaflet blades ovate to lanceolate, rounded or cuneate at the base, acuminate with a hairy mucro at the apex, sparsely covered with long hairs (mostly inserted on the veins and venules) on both sides, ciliate on the margin, the blades of the basal pair 3.5 to 5.5 cm. long, 2 to 3 cm. broad, those of the terminal pair 9.5 to 13 cm. long, 3.5 to 5 cm. broad.

Inflorescences axillary, single; peduncles long-hairy, slender, about 8 cm. long; flower heads oblong, the rachis about 3 cm. long; flowers pedicellate; bractlets lanceolate, 2 to 4 mm. long, hairy outside, glabrous inside, subpersistent; pedicels hairy, 1.9 to 2.8 (2.3) mm. long; calyx tubular, sparsely hairy, 4 mm. long, the teeth small, acute, separated by rounded sinuses; corolla tubular-funnelform, villous, 10.8 to 11.5 (11.1) mm. long, the lobes short (2.5 mm. deep), narrow, acute; staminal tube included; ovary glabrous.

Legume not known.

Type in the U. S. National Herbarium, no. 408211, collected near the Finca Sepacuité, Alta Verapaz, Guatemala, in forest, flowers, March 27, 1902, by O. F. Cook and R. F. Griggs (no. 505).

Numbers 202 and 226 of the same collectors are leaves obtained at the same date and locality.

The pedicellate flowers of this species constitute a new departure among the *Pseudingae-Vulpinae*. While its general affinities seem to lean indisputably to this group, the plant stands by itself on account of its habit and other characters, and no closer relationship can be suggested.

The collectors note that the flowers are almost scentless.

Series 8. **DYSANTHAE.**

A NEW SPECIES.

***Inga standleyana* Pittler, sp. nov.**

A low tree with rounded crown, the young branchlets, peduncles, rachis of the leaves, and flower heads densely ferruginous-hairy.

Rachis of the leaves nude, terete, 10 to 15 cm. long, the petiolar part 2.5 to 4 cm. long; stipules absent or very early deciduous; leaflets 4-jugate, or very seldom 3-jugate, subsessile; glands large, sessile, pertuse, the rim light brown, the pit dark brown; leaflet blades suboblique, ovate or obovate, rounded and subemarginate at the base, acuminate or obtuse at the apex, glabrous and sublustrous above (except on the ferruginous-hairy costa), the veins slender and impressed, softly villous and prominently veined and reticulate beneath, ciliate on the margin, the blades of the basal pair 5 to 9 cm. long, 4 to 4.5 cm. broad, those of the terminal pair 11 to 13 cm. long, 6.5 to 8 cm. broad.

Inflorescences axillary, mostly geminate, sometimes single; peduncles 2.5 to 4 cm. long; flower heads elongate, the rachis 2.5 to 5 cm. long; flowers thick and short, deciduous; bractlets very small (about 1 mm. long), ovate, pubescent without, glabrous within, caducous; calyx 5 mm. long, tomentose without, hairy at the base, glabrous at the apex within, the teeth broad, obtuse, separated by shallow, rounded sinuses; corolla 20 mm. long, broad, tomentose outside, glabrous inside, the lobes 3 to 4 mm. long, broad, obtuse; staminal tube equaling the corolla, pink, as also the filaments; ovary with a single series of minute white hairs along the sutural lines; style about 5 cm. long.

Legume flat and densely rufous-hairy (not seen).

Type in the U. S. National Herbarium, no. 715742, collected in the vicinity of La Palma, southern Darién, Panama, in old clearings, flowers, January 26, 1912, by H. Pittier (no. 5496).

This is the only representative of the Pseudingae-Dysanthae so far reported from Central America. It differs from the two other species in its wingless leaf rachis, but except for the shorter calyx the flowers look exactly like those of the Brazilian *Inga dysantha* Benth. I was not able to collect the fruits, but was informed that they are small, flat, and rufous-hairy, the latter fact being confirmed by the local name of "guabito peludo."

Named in honor of Mr. Paul C. Standley, Assistant Curator of the U. S. National Herbarium.

Section 5. EUINGA.

As already noted by Bentham, the identification of the species of this group is extremely difficult, and it may be added that little progress has been made since the publication of that author's Revision of the Mimoseae in 1875. Few new species have been added and we are still in the dark with reference to the fruit characters of a large number of the old ones. Recent investigations in Central America have brought to light the existence of a number of forms of the *Inga insignis* type, characterized mainly by tetragonous fruits, accompanied by flowers not unlike those of the Longiflorae. These species, eight in number if we add *I. fendleriana* Benth., which probably belongs here, form in the section a distinct series, which is here separately treated under the name of Tetragonae, referring to the quadrangular cross section of the fruit. The remaining species, except one, resemble more or less *I. edulis* as to the legume, in which the many-sulcate margins are expanded so as to more or less obliterate the faces. On account of this characteristic form of the fruit this series, which may be again subdivided, is designated by the term Sulcatae.

These two series seem to constitute very natural groups and the distinction drawn between them will certainly help the student in determining the species of this very large section. As mentioned above, this new arrangement excludes one species, *I. sessilis* (Vell.) Mart., which, in my opinion, would be better placed with Pseudinga, among the Vulpinae.

Series 1. TETRAGONAE.

DESCRIPTIONS OF OLD AND NEW SPECIES.

Of the Central American species of this group, two, *Inga pittieri* Micheli and *I. preussii* Harms, have been published previously. As the original diagnosis of the first is not very satisfactory and we have in our collections the fruit of the second, not known heretofore, I deem it useful to repeat here full descriptions of both. Besides these, four new species are introduced. The six have in com-

mon the presence on the calyx and corolla of minute purple hairs mixed with the general pubescence, a character which evidently denotes a very close relationship.

Two more species, represented by *Cook & Griggs* 631, from Guatemala, and *Williams* 673, from Panama, are probably new, and belong to this series, but the specimens at hand are too imperfect to admit of description.

Inga pittleri Michell, Bull. Herb. Boiss. 2: 446. pl. 13. 1894.

A small tree, 8 meters high, the trunk 10 cm. in diameter (*Williams*); branchlets terete or angulate, the grayish bark lenticellose, the younger parts densely fulvous-pubescent.

Rachis of the leaves rufous, fulvous, or greenish-pubescent, partly wingless, marginate, or narrowly winged, 6 to 17 cm. long, the petiolar part terete or subulate, 2.5 to 5.5 cm. long, the wings narrow but gradually broadening from the basal to the terminal leaflets; stipules ovate to oblong or lanceolate, obtuse, striate, minutely pubescent without, subpersistent, 8 to 16 mm. long, 5 to 9 mm. broad; leaflets 3-jugate, seldom 1 or 2-jugate, oblique, short-petiolulate, coriaceous; glands small, sessile or substipitate, pertuse; petiolules 2 to 4 mm. long, thick, densely fulvous-pubescent; leaflet blades ovate to ovate-elliptic, rounded or subcuneate at the base, acute or abruptly acuminate and often mucronate at the apex, light green and at first sparsely scabrous-pubescent above, glabrescent later, the costa and veins densely fulvous-pubescent, beneath paler, reticulate, and softly pubescent, the prominent costa and veins densely fulvous-pubescent, the blades of the basal pair 6 to 12 cm. long, 2.5 to 5 cm. broad, those of the terminal pair 13 to 23 cm. long, 6 to 11 cm. broad.

Inflorescences single, axillary or subterminal, the peduncles 1 to 4 cm. long, densely fulvous-pubescent; flower heads ovoid or elongate, dense, the rachis 2.5 to 3.5 cm. long, the bracts at the base of the heads often large, ovate-acuminate, 5 to 7 mm. long, caducous; floral bractlets linear-lanceolate or linear, pubescent without, 7 to 12 mm. long, subpersistent; flowers sessile, the calyx and corolla sparsely dotted with minute reddish hairs; calyx tubular, 8 to 13 (10.5) mm. long, more or less grayish-pubescent, striate, the sinuses between the linear, subulate teeth rounded, 3 to 4 mm. deep; corolla pinkish white, tubular, broadening toward the apex, sparsely appressed-villous, 19.5 to 24 (21.8) mm. long, the lobes densely villous, narrow, rounded or acute, 1 to 4 mm. long; staminal tube about equaling the corolla, the pinkish stamens about 5.5 to 6 cm. long; pistil 6 cm. long or over; ovary glabrous, sessile, often constricted at the base, 4-sulcate, about 3 mm. long; stigma peltate, concave.

Legume sessile, glabrous, 9 to 18 cm. long, the valves concave, 1.5 to 2.5 cm. broad, these and the margins more or less regularly 6-sulcate, 1.3 to 1.8 cm. broad, coming equally together in a cuspidate apex; seeds about 20, ovate-oblong.

PANAMA: Forests around San Felix, eastern Chiriquí, flowers, December 30, 1911, *Pittier* 5452. Bismarck, above Penonomé, Province of Coclé, alt. 700 to 1,000 meters, fruits, March 5 to 19, 1908, *Williams* 489.

COSTA RICA: Banks of Río Celbo, near Buenos Aires, Diquís Valley, alt. about 300 meters, flowers and fruits, February, 1892, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 4977, type.) Around Santo Domingo de Osa, in forests, flowers and fruits, March, 1896, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 10030). Coffee plantations near Juan Viñas, Reventazón Valley, alt. 1,000 meters, fruits, April 26, 1903, *Cook & Doyle* 389.

The late M. Micheli compared this very variable species with *Inga insignis* Kunth, from the South American Andes. The relationship is not very apparent, except perhaps in the peculiar shape of the fruits. With reference to the habit, foliage, and flowers, the likeness with *I. panamensis* Benth. is much more striking, even if it is out of question to claim any close affinity between these two species.

Inga preussii Harms, Repert. Nov. Sp. Fedde 13: 420. 1914.

A tree 15 meters high; branchlets angulate, the bark brownish gray, lenticellose, the younger parts densely brownish-pubescent.

Rachis of the leaves densely brownish-villous, winged between the leaflet pairs, 5 to 13 cm. long, the petiolar part 1.5 to 3 cm. long; stipules ovate or ovate-lanceolate, densely tomentose-pubescent without, about 5 mm. long; leaflets 3 or 4-jugate, petiolulate, coriaceous; glands small, subsessile, pertuse; petiolules 2 mm. long or less, densely brownish-pubescent; leaflet blades ovate to ovate-elliptic or oblong, subacute or obtuse at the base, acute or rarely acuminate at the apex, light green and sparsely pilose above, paler, reticulate, and densely villosulous beneath, the costa and veins pubescent on both faces and prominent beneath; blades of the basal pair 5.5 to 6.5 cm. long, 2.5 to 3 cm. broad, those of the terminal pair 10 to 12 cm. long, 5 to 7 cm. broad.

Inflorescences single or geminate in the axils of the leaves, the peduncles 6 to 10 cm. long, the flower heads ovoid-elongate; bractlets lanceolate, acute, 7 to 14 mm. long; flowers pedicellate(?); calyx tubular, villosulous or sparsely hairy, more or less striate, 10 to 12 mm. long; corolla densely silky-villous, about 2 cm. long; staminal tube short-exserted.

Legume sessile, stipitate, glabrous, 21 cm. long or less, the valves 2.5 to 3.5 cm. broad, concave, meeting in a rounded apex, the margins concave, broadly 3-sulcate, 1 to 1.5 cm. broad at the base and gradually narrowing toward the apex.

EL SALVADOR: Hacienda Guadalupe, near San Salvador, flowers, February, 1900, *Preuss* 1386 (type). Above Izalco, Department of Sonsonate, alt. 800 meters, fruits, February 25, 1907, *Pittier* 1974.

The "cujiniquil," or "cujín," is probably the species most frequently used as coffee shade in El Salvador and western Guatemala. According to the plate in *Preuss's* work,¹ where the species was first cited, the flowers are pedicellate, a character which would distinguish it from all the other members of the group; this character, however, is doubtful, as it is not mentioned by Harms, and the fruits appear to be sessile. *Inga rensoni*, which is closely related, is densely fulvous-pubescent; its bractlets are exceptionally developed, and its calyx is very long.

Inga biolleyana Pittier, sp. nov.

A tree; branchlets angulate, covered with lenticels, the younger parts ferruginous-pubescent.

Rachis of the leaves terete, exalate, marginate, or winged only under the upper leaflet pair, ferruginous-pubescent, 4 to 9 cm. long, the petiolar part always smooth, 2 to 3 cm. long, the wing, when present, up to 4 mm. broad; stipules broadly ovate, acute, 7 to 9 mm. long, ferruginous-pubescent without, persistent; leaflets sometimes 2-jugate, mostly 3-jugate, subcoriaceous, petiolulate, the terminal ones oblique; glands small, short-stipitate, often obsolete; petiolules pubescent, 2 to 3 mm. long; leaflet blades ovate-elliptic, cuneate to an obtuse base, acute at the apex, sparsely hairy or glabrescent and more or less lustrous above, paler, reticulate, and sparsely hairy beneath, the costa

¹ Expedition nach Central- und Südamerika 354. pl. 8. f. 1, 2. 1901.

and veins pubescent on both faces and very prominent on the inferior one, the blades of the basal pair 4.5 to 8 cm. long, 2 to 3.5 cm. broad, those of the terminal pair 11.5 to 15 cm. long, 4 to 6 cm. broad.

Floral spikes single in the axils of the upper leaves, the peduncles ferruginous-hairy, striate, 1 to 1.5 cm. long, the heads few-flowered; bractlets linear-lanceolate, acute, striate, sparsely pubescent, about equaling the calyx (9 to 12 mm. long), persistent; flowers sessile; calyx tubular, 10.3 to 12 (11.1) mm. long, the tube sparsely covered with a fulvous, appressed pubescence mixed with numerous short, purplish hairs, the teeth triangular, acute, 2 to 3.5 mm. long, densely hairy; corolla tubular, broadening toward the apex, silky-villous, 28 to 31 (29.5) mm. long, the lobes triangular, acute, 2 to 3 mm. long; staminal tube long-exserted, the filaments purple; ovary 4-sulcate.

Legume not known.

Type in the U. S. National Herbarium, no. 865489, collected at Turrialba, Costa Rica, altitude 570 meters, in pastures, flowers, November, 1893, by A. Tonduz (Inst. Fís. Geogr. Costa Rica, no. 8391).

A species conspicuous for the short, almost exalate rachis of the leaves, the relatively small leaflets, etc. The calyx has short, very hairy teeth, a feature which does not seem to occur in the other species of the group.

Inga biolleyana is dedicated to the memory of the late Prof. Paul Biolley, a Swiss naturalist, actively interested during his life in the investigation of the flora of Costa Rica.

Inga jimeneziana Pittier, sp. nov.

A tree with rounded crown; branchlets angulate, covered with large lenticels, the younger parts ferruginous-hairy.

Rachis of the leaves narrowly winged, sparsely ferruginous-hairy or glabrescent, 5 to 15 cm. long, the petiolar part nude or marginate, 2.5 to 5.5 cm. long; stipules ovate-lanceolate, subcordate at the base, acute, 1.2 to 2 cm. long, 0.6 to 0.8 cm. broad, pubescent without, coriaceous, persistent; leaflets 2 or 3-jugate, rarely 4-jugate, membranous, subsessile (the petiolules not over 1 mm. long); glands small, mostly long-stipitate; leaflet blades broadly ovate to ovate-elliptic, broadly rounded or subacute at the base, more or less abruptly acuminate at the apex, sparsely hairy or glabrescent and lustrous above, with the subprominent costa and veins more or less fulvous-hairy, paler and reticulate beneath, the costa, veins, and venules more or less fulvous-hairy; leaflets of the basal pair 7 to 13.5 cm. long, 3 to 6.5 cm. broad, those of the terminal pair 14 to 21 cm. long, 6.5 to 11 cm. broad.

Floral spikes single or geminate and subpaniculate in the axils of the upper leaves, the peduncles 1.5 to 4 cm. long, fulvous-hairy, striate, the flower heads elongate; bractlets lanceolate to linear, acute, 1 to 1.5 cm. long, pubescent without, persistent; flowers sessile; calyx tubular, striate, fulvous-pubescent, 11 to 13.2 (12) mm. long, the teeth narrow and subulate, 3.5 to 7 mm. long; corolla tube narrow, shortly broadened at the apex, white, villous, 31.7 to 32.5 (32.1) mm. long, the lobes broadly triangular, acute, 2.5 to 3.5 mm. long; staminal tube equaling the corolla or shorter, the filaments deep purple, the stamens 8 to 8.5 cm. long; style truncate, longer than the stamens.

Legume sessile, subcuneate at the base, cuspidate at the apex, glabrous, 11.5 to 30 cm. long, the valves almost flat or slightly depressed, 3 cm. broad, the margin concave, bisulcate, 1.5 cm. broad.

Type in the U. S. National Herbarium, no. 865512, collected on the banks of the Colorado River near Turrialba, Costa Rica, flowers and fruits, November, 1893, by A. Tonduz (Inst. Fís. Geogr. Costa Rica, no. 8333).

COSTA RICA: (Besides type) Aragón, near Turrialba, flowers, October, 1894, *Pittier* (Inst. Fis. Geogr. Costa Rica, no. 9041). Las Vueltas de Tucurrique, in pastures, flowers and fruits, April, 1892, *Tonduz* (Inst. Fis. Geogr. Costa Rica, no. 13055).

This differs from *Inga pittieri*, with which it has been confused, in the pubescence of the leaves, the long-stipitate glands, the larger flowers, and the flat, compressed fruits. From *I. rodrigueziana* and *I. preussii* it is distinguished by the persistent stipules, the stipitate glands, the thicker pubescence, and the size of the flowers.

This species is named for Mr. Otón Jiménez Luthmer, an enthusiastic young botanist of Costa Rica.

***Inga rensoni* Pittier, sp. nov.**

A tree; branchlets terete or subangulate, sparsely lenticellose, the younger parts densely fulvous-hairy.

Rachis of the leaves densely fulvous-hairy, winged, 8 to 12 cm. long, the petiolar part subulate, marginate, or terete, 2 to 2.5 cm. long; stipules ovate or oblong, obtuse, fulvous-pubescent, 6 to 12 mm. long, subpersistent; leaflets mostly 4-jugate, oblique, petiolate, coriaceous; glands subsessile, transversely ovate or irregular, concave or flat; petiolules densely fulvous-hairy, 2 to 3 mm. long; leaflet blades ovate or ovate-lanceolate, rounded at the base, acute at the apex, more or less pubescent and sublustrous above, the costa and impressed veins densely fulvous-hairy, reticulate and tomentose-pubescent beneath, with very prominent venation, the blades of the basal pair 6 to 8 cm. long, 2.5 to 3.5 cm. broad, those of the terminal pair 10 to 13 cm. long, 5 to 6 cm. broad.

Inflorescences single in the axils of the leaves, the peduncles 2 to 2.5 cm. long, fulvous-hairy, subangulate, the flower heads ovoid or elongate; bractlets conspicuous, linear-lanceolate to ovate, acute, pubescent without, subpersistent, 10 to 22 mm. long, the basal ones 8 mm., the upper ones 2 mm. broad; flowers sessile; calyx tubular, irregular in length, 14 to 22.5 (18.6) mm. long, striate, sparsely appressed-pubescent, often substipitate, the teeth linear, reflexed, 3 to 9.5 mm. long; corolla tubular, silky-villous, 21 to 22 mm. long, the lobes obtuse, 3 to 4 mm. long; staminal tube included, the stamens about 5 cm. long; ovary glabrous, sessile, about 4 mm. long, 4-sulcate; style capitellate.

Legume glabrous, short-pedunculate (the peduncles thick, 3 to 5 mm. long), substipitate, about 18 cm. long, the valves flat or concave, 3 to 3.5 cm. broad, more or less adnate at the pointed apex, the margins concave, broadly 2-sulcate, 1 to 2 cm. broad.

Type in the U. S. National Herbarium, no. 399534, collected in the vicinity of San Salvador, El Salvador, in coffee plantations, by C. Renson (no. 239).

This species differs from *Inga preussii* in the pubescence, in the length of the peduncles and calyx, in the shape of the fruits, and in the conspicuous bractlets. It is named for Dr. Carlos Renson, its discoverer, in recognition of his interest in the Salvadorean flora.

***Inga rodrigueziana* Pittier, sp. nov.**

A tree; branchlets terete or subangulate, the bark grayish, lenticellose, the young parts densely ferruginous-pubescent.

Rachis of the leaves winged, densely ferruginous-pubescent, 13 to 19 cm. long, the petiolar part terete or submarginate, 4 to 4.5 cm. long, the wings narrow, shorter than the space between the leaflets; stipules ovate, obtuse, pubescent without, about 7 mm. long and 4 mm. broad, caducous; leaflets 3 or 4-jugate (usually 3-jugate), large, oblique, coriaceous, petiolulate, the pairs about 5 cm. distant; glands subsessile, flat at the apex, with a light rim and

dark pit; petiolules thick, 2 to 5 mm. long; costa and veins densely ferruginous-pubescent; leaflet blades elliptic-ovate or lanceolate, rounded and sometimes subemarginate at the base, sparsely villous and sublustrous above, reticulate and villous beneath, with prominent costa and veins, the blades of the lower pair 10 to 11 cm. long, about 5 cm. broad, those of the upper pair 17 to 21 cm. long, 8 to 10 cm. broad.

Inflorescences single in the axils of the leaves; peduncles stout, striate or subangulate, ferruginous-hairy, 5 to 7 cm. long; flower heads ovoid, dense; bractlets linear-lanceolate or narrowly oblanceolate, acute, pubescent without, subpersistent, 10 to 18 mm. long; flowers numerous, sessile; calyx tubular, striate, sparsely appressed-pubescent, 13 to 15 (14.1) mm. long, the teeth obtuse, 1 to 4 mm. long; corolla tubular, slightly widening toward the apex, densely silky-villous, 27.3 to 29.3 (28.2) mm. long, the lobes obtuse, irregular, 3 to 4 mm. long; staminal tube about equaling the corolla; pistil 6 cm. long, the ovary glabrous, 2-sulcate; stigma subpeltate.

Legume not known.

Type in the U. S. National Herbarium, no. 258943, collected at Las Viñas, Department of Santa Rosa, Guatemala, flowers, September, 1893, by Heyde and Lux (J. D. Smith, no. 6095).

GUATEMALA: (Besides type) Cubilquitz, Alta Verapaz, flowers, March, 1901, *von Türckheim* (J. D. Smith, no. 7855). El Rancho, Department of Jalapa, flowers, January 12, 1908, *Kellerman* 7670.

This species was determined by the late Micheli as *Inga insignis* Kunth, a South American species of which this Guatemalan plant is only a distant relative, differing in the size and shape of the leaves, in the number of leaflets, and in the appearance of the glands, as well as in the larger and less hairy flowers. It is more closely allied to *Inga pittieri*, from which it departs only in its coarser, narrower, and more hairy leaves and its much larger flowers. It is named for Mr. Juan J. Rodríguez, a well-known Guatemalan naturalist.

Series 2. SULCATAE.

DESCRIPTIONS OF NEW AND OLD SPECIES.

Inga adenophylla Pittier, sp. nov.

A low, spreading tree; branchlets terete or angulate, the younger growth rufous or fulvous-tomentellous.

Rachis of the leaves slender, winged, fulvous-pubescent or tomentellous, 8 to 18 cm. long, the petiolar part winged or wingless, 2 to 3 cm. long, the wings narrow (0.5 cm. broad) below the basal leaflets, broadening to 2.5 cm. toward the apex and there triangular, with the base toward the terminal leaflets; stipules linear, narrowly acute, pubescent, about 12 mm. long, deciduous; leaflets 5 or 6-jugate, petiolulate, coriaceous; glands small, substipitate, pertuse, inserted not only between the leaflets but also 5 or 6 of them along the costa of each leaflet; petiolules 2 to 4 mm. long, fulvous-tomentellous; leaflet blades ovate or obovate, rounded at the base, obtuse or subacute and mucronate at the apex, the upper face sparsely pilosulous or glabrescent, the costa pubescent and slightly prominent and the veins slender and impressed, the lower face tomentose and strongly reticulate, the costa and veins densely fulvous-pubescent and very prominent; blades of the basal pair of leaflets 4 to 6 cm. long, 1.5 to 3 cm. broad, those of the terminal pair 8 to 11 cm. long, 3.5 to 5.5 cm. broad.

Floral spikes geminate in the axils of the upper leaves, the peduncles stout, rufous or fulvous-tomentellous, 2 to 5 cm. long; bractlets linear-lanceolate, 7

mm. long or shorter, caducous; flowers sessile; calyx rufous-tomentellous, broad, 5 to 8.5 mm. long, the teeth either very short or up to 3 mm. long; corolla silky-villous, broader at the apex, 15 to 17 mm. long, the lobes 3 to 3.5 mm. long; staminal tube included or slightly exserted; pistil 4.5 to 5 cm. long, the stamens a little shorter; stigma capitellate, flat at the apex.

Legume funiculiform, slender (about 0.8 cm. in diameter), 10 to 15 cm. long, rufous-tomentellous, the sulcate margins almost entirely covering the valves.

Type in the Gray Herbarium, collected at Yungas, Bolivia, in 1890, by Miguel Bang (no. 236).

BOLIVIA: (Besides type) Unduavi, alt. 2,650 meters, flowers, October, 1885, *Rusby* 991. Apolo, along stream, alt. 1,600 meters, flowers and young fruits, September 6, 1902, *Williams* 1602. Polo-Polo, near Coroico, Yungas del Norte, alt. 1,100 meters, flowers, October, 1912, *Buchtien* 3779.

PERU: San Miguel, Urubamba Valley, alt. about 1,800 meters, flowers, May 23 and 28, 1915, *Cook & Gilbert* 875, 948.

The characteristic feature of this species is the presence on the costa of the leaflets of extrafloral nectaries like those found on the rachis. This has been reported so far only in the case of *Inga pruriens* Poepp. & Endl., a lost Peruvian species which belongs to another section. The shape of the wings, the size of the calyx, etc. seem to be very variable.

Inga cocleensis Pittier, sp. nov.

A tree; young branchlets, leaf rachis, and rachis of the floral spikes velvety rubiginous pubescent.

Rachis (of the only leaf present) wingless, terete, 18.5 cm. long, the petiolar part 2 to 2.5 cm. long; leaflets 6-jugate, petiolulate, coriaceous; glands mostly large, prominent, often transversely ovate, concave; petiolules 3 to 5 mm. long, thick, densely velvety-pubescent; leaflet blades oblong-elliptic, broadly rounded at the base, acuminate at the apex, pilosulous and more or less strigose above, the costa and impressed veins more or less ferruginous-pubescent, beneath densely pubescent and reticulate, the costa and veins very prominent, the blades of the basal pair 4 to 7.5 cm. long, 1.5 to 3 cm. broad, those of the terminal pair 9.5 to 13 cm. long, 2.5 to 4.5 cm. broad.

Inflorescences single in the axils of the leaves; peduncles terete or subangulate, 4 to 5 cm. long; rachis of the flower heads thick, 4 cm. long; calyx tubular, rubiginous-pubescent, 6 to 7 mm. long; corolla not seen.

Legume (immature) slender, terete, longitudinally sulcate, minutely rubiginous-pubescent, cuspidate, twisted, 10 to 20 cm. long.

Type in the Herbarium of the New York Botanical Garden, collected at Bismarck, above Penonomé, Province of Coclé, Panama, at an altitude of 700 to 1,000 meters, fruits, March 5 to 19, 1908, by R. S. Williams (no. 405).

Perhaps closely related to *Inga rubiginosa* DC., from the Guianas, but readily distinguished by the larger number and elongated shape of the leaflets. The only known specimen was found on the ground, broken off from the tree, and is very incomplete, but it is sufficient to show that the plant belongs to a small group represented in Central America by only one other species (*I. eriorhachis*), and to exclude the possibility of its being confused with any other type.

Inga donnell-smithii Pittier, sp. nov.

A low tree; branches terete, with gray bark, the younger parts densely rufous-hairy.

Rachis of the leaves thick, winged, densely rufous-hairy, 11 to 18 cm. long, the petiolar part wingless, 1 to 2 cm. long, the wings more or less sparsely

hairy, 4 to 10 mm. broad; stipules ovate, obtuse, densely rufous-hairy, about 4 mm. long, caducous; leaflets 7-jugate, short-petiolulate, coriaceous; glands small, subsessile, suborbicular, pertuse; petiolules thick, hairy, not over 1 mm. long; leaflet blades oblique, oblong, rounded at the base, acuminate, sparsely appressed-hairy on both faces, dark green above, paler and reticulate beneath, the costa and veins prominent and densely rufous hairy, the blades of the basal pair 4 to 5.5 cm. long, 1 to 2 cm. broad, those of the terminal pair 10 to 14 cm. long, 3 cm. broad.

Inflorescences single, axillary; peduncles and rachis densely rufous-hairy, the former 2 to 4.5 cm. long; flower heads elongate, the lower flowers deciduous, the rachis 4 to 6 cm. long; flowers large, sessile; bractlets ovate, acute, rufous-pubescent, 6 to 10 mm. long, early deciduous; calyx tubular, slightly broader at the apex, densely rufous-hairy without, 19 to 21 mm. long, the teeth about 6 mm. long; corolla tubular, densely rufous-hairy without, about 22 mm. long, the lobes ovate, acute, about 5 mm. long; staminal tube shorter than the corolla, the stamens about 7 cm. long; pistil 8 to 8.5 cm. long; ovary villous at the base; style capitellate.

Legume not known.

Type in the John Donnell Smith Herbarium, collected at El Guarda Viejo, near Guatemala City, Guatemala, at an altitude of about 1,670 meters, flowers, February, 1890, by John Donnell Smith (no. 2316).

The general affinities of this species are with *Inga spuria* Willd., but it differs in its abundant pubescence and 7-jugate leaflets, and in having the floral spikes always single in the axils of the leaves and the ovary villous at the base.

Inga eriocarpa Benth. Lond. Journ. Bot. 4: 615. 1845.

Branchlets subangulate, the younger parts, the rachis of the leaves, and the inflorescences densely fuliginous or brown-hairy.

Rachis of the leaves broadly winged, 10 to 12.5 cm. long, the petiolar part mostly nude, 1 to 2 cm. long; leaflets 5-jugate, rarely 4 or 6-jugate, subsessile, coriaceous; glands rather large, sessile, concave, darkish; leaflet blades sub-oblique, ovate, rounded or subemarginate at the base, subacute at the apex, glabrescent or sparsely appressed-hairy above, the costa densely fulvous-hairy, beneath softly hairy and subreticulate, the costa and veins strongly prominent, the blades of the basal pair 1.5 to 4 cm. long, 0.7 to 1.5 cm. broad, those of the terminal pair 7 to 8.5 cm. long, 3 to 3.5 cm. broad.

Inflorescences paniculate at the ends of the branchlets, sometimes sessile, but usually on peduncles 1.5 to 2.5 cm. long from base to insertion of the first flower; flower heads elongate, the lower flowers deciduous, the rachis up to 6 cm. long; flowers sessile; bractlets ovate, fulvous-hairy without, about 8 mm. long, caducous; calyx turbinate, thickly fulvous-hairy without, 13 to 14 (13.4) mm. long, the teeth acute, 4 to 6.5 mm. long; corolla tubular, the upper half broadened, silky-villous, 20.8 to 21.7 (21.1) mm. long, the lobes ovate, subobtuse, 5 to 5.5 mm. long; staminal tube almost equaling the corolla, the stamens 7 to 8 cm. long; pistil about 8 cm. long, the ovary short (4 mm.), sessile, 20-ovulate, the style capitellate.

Legume (fide Bentham) subterete, sulcate, densely tomentose.

MEXICO: Between San Blas and Guadalajara, Tepic or Jalisco, *Coulter* (type). Cuernavaca, State of Morelos, 1866, *Bilimek* 136; flowers, May 27 to 30, 1899, *Rose & Hough* 4361. Orizaba, State of Veracruz, flowers, March 15, 1867, *Bilimek* 127. Monte de Sta. Ignesa, State of Michoacán, alt. 1,500 meters, flowers, March 16, 1898, *Langlassé* 34. Along road between Jalapa and Mascota, State of Jalisco, alt. 1,300 to 1,600 meters, flowers, March 18, 1897, *Nelson* 4042.

This species, which is undoubtedly distinct from any other, corresponds fairly in its description with *Inga eriocarpa* Benth., which Bentham united later with *I. xalapensis*. The flowers, however, are larger than in the latter species and the pubescence of the calyx is quite distinct.

***Inga fissicalyx* Pittier, sp. nov.**

Branchlets subangulate, the bark brownish and lenticellate, the younger parts, rachis of the leaves, and inflorescence more or less densely covered with a brown, hirtellous pubescence.

Rachis of the leaves narrowly winged, 11 to 14 cm. long, the petiolar part more or less distinctly winged, 1 to 2 cm. long, the wings 3 to 7 mm. broad, the terminal ones oblong, the others elliptic; stipules linear-lanceolate, pubescent, 8 to 10 mm. long, caducous; leaflets 6-jugate, petiolulate, coriaceous; glands small, sessile, convex, orbicular or transversely ovate; petiolules thick, 2 to 3 mm. long, densely brown-hairy; leaflet blades lanceolate or oblanceolate, narrow and rounded at the base, long-attenuate and acute at the apex, sparsely covered above with appressed hairs except on the densely pubescent costa, softly hairy and reticulate beneath, the costa and veins densely pubescent and prominent, the blades of the basal pair 2.5 to 3 cm. long, 1.5 cm. broad, those of the terminal pair 8 to 11 cm. long and 2.5 to 3.5 cm. broad.

Inflorescences axillary and geminate; peduncles striate, 5 to 7 cm. long; flower heads elongating in anthesis, the rachis 5 to 8 cm. long; flowers sessile, caducous; bractlets lanceolate, subobtuse, light brown pubescent, about 10 mm. long, caducous; calyx tubular, narrow at the base, gradually widening toward the apex, densely fuliginous-pubescent, 20 to 28 (23) mm. long, the teeth narrow and pointed, 8.5 to 12 mm. long; corolla tubular, narrow, gradually widening toward the apex, softly villous, 18 to 23 (21.5) mm. long, the lobes wide and obtuse, 3 to 4 mm. long, reflexed; staminal tube equaling the corolla, the stamens 5 to 6 cm. long; pistil about 8.5 cm. long, the ovary linear, sessile, 3 to 4 mm. long, bisulcate, glabrous, 20 to 22-ovulate; style filiform, attenuate, capitellate.

Legume not known.

Type in the Gray Herbarium, collected in the vicinity of Zacuapan, State of Veracruz, Mexico, flowers, May, 1906, by C. A. Purpus, (no. 1917).

Also collected in eastern Guatemala, without further data, *Bingham* (Gray Herb.).

This species has been distributed as *Inga xalapensis* Benth.? According to the incomplete diagnosis, however, the latter species has 5-jugate leaflets, and in specimens authentically identified the calyx is only about 11 mm. and the corolla about 16 mm. long, while in our species the calyx is 23 mm. long and the corolla shorter, even, or slightly longer than the calyx. The very long calyx teeth and the comparatively short corolla lobes are other characteristic features of *I. fissicalyx*.

***Inga holtonii* Pittier, sp. nov.**

A tree; young branchlets angulate, densely ferruginous-velvety.

Rachis of the leaves thick, winged, densely ferruginous-velvety, 14 to 19 cm. long, the petiolar part narrowly winged, 3.5 to 4.5 cm. long, the interfoliolar wings 1 to 1.5 cm. broad; stipules linear, pubescent, about 1.5 cm. long, caducous; leaflets 4 or 5-jugate, short-petiolulate (the petiolules not over 1 mm. long), thick, coriaceous; glands very small, subsessile; leaflet blades oblong or obovate, broadly rounded at the base, acute and mucronate at the apex, the upper face sparsely appressed-hairy or glabrescent, the costa and veins densely ferruginous-hairy, the lower face ferruginous-tomentose, reticulate, the costa and veins very prominent and hairy; basal leaflets 7 to 8 cm. long, 3.5 cm. broad, the terminal ones 14 to 19 cm. long, 5 to 7 cm. broad.

Inflorescences paniculate at the ends of the branchlets, the spikes single or geminate in the axils; peduncles stout, densely ferruginous-velvety, 2.5 to 5 cm. long; bractlets linear, pubescent, 6 to 10 mm. long, caducous; flowers sessile; calyx stipitate or substipitate, ferruginous-hairy, 12.5 to 14 mm. long, the teeth broad-triangular, acute, 4 to 5 mm. long; corolla softly and densely villous, broad, 20 to 22 mm. long, the lobes ovate, acute, 5 to 7 mm. long; staminal tube included; pistil 6.5 to 7 cm. long; ovary glabrous, 1-sulcate; stigma clavate.

Legume not known.

Type in the Gray Herbarium, collected at La Paila, Cauca Valley, Colombia, flowers, March 17, 1853, by I. F. Holton (no. 1004).

COLOMBIA: Near Buga, Cauca Valley, alt. 900 meters, flowers, July 25, 1881, *Lehmann* 779. Fusagasugá, Province of Bogotá, alt. 1,500 meters, *Triana* 1170.

The specimens collected by Triana were distributed under the name *Inga ornata* Kunth, a species reduced by Bentham to *I. ingoides* (A. Rich.) Willd., in which the flowers are always pedicellate, the pedicel length varying from 2 to 5 mm. In Triana's plant as well as in Holton's and Lehmann's the calyx is short-stipitate but sessile. One of Holton's specimens is labeled *I. pachycarpa* Benth., which is supposed to be the same as *I. insignis* Kunth. That species, however, has a tetragonous fruit, while the shape of the ovary in *I. holtonii* indicates a subcylindrical, many-sulcate legume. The general characters also show a closer relationship with the species of the *I. spuria* group.

Inga pauciflora Walp. & Duchass. Walp. Ann. Bot. 2: 460. 1848-1850.

PLATE 103.

A shrub about 3 meters high, the single trunks about 5 cm. in diameter; bark smooth, brownish gray; young branchlets densely ferruginous-hairy.

Rachis of the leaves winged, densely ferruginous-hairy or pubescent, 4.5 to 8.5 cm. long, the petiolar part nude, 0.5 to 1.5 cm. long, the wings 4 to 10 mm. broad; stipules ovate, obtuse, hairy, about 4 mm. long, early caducous; leaflets 2 to 4-jugate, mostly 3-jugate, short-petiolulate, coriaceous; glands very small, rounded, pertuse, subsessile; petiolules fulvous or ferruginous-hairy, about 1 mm. long; leaflet blades ovate or obovate to elliptic, subcuneate or rounded at the base, obtuse or acuminate at the apex, appressed-pilosulous above, with impressed costa and veins, villous-tomentose beneath, principally on the prominent costa and veins, the blades of the basal pair 2 to 5 cm. long, 1.3 to 2 cm. broad, those of the terminal pair 5.5 to 13 cm. long, 2 to 5 cm. broad.

Inflorescences single or geminate, axillary or terminal; peduncles ferruginous-pubescent, 1.5 to 2 cm. long; flower heads ovoid, the rachis hairy, 1.5 to 2 cm. long; bractlets very small, short and broad, obtuse, caducous; calyx tubular, slightly broadened at the apex, ferruginous-pubescent, 8 to 10 mm. long, the teeth short, broad, acute; corolla tubular, white, silky-hairy, 15 to 17 mm. long, the lobes ovate, obtuse, about 3 mm. long; staminal tube included, the stamens about 4.5 cm. long from the base; pistil about 5 cm. long; stigma capitellate.

Legume not known.

PANAMA: Panama, *Duchassaing*, the specimen in the Gray Herbarium being the type or at least part of it. Ancón Hill, Canal Zone, alt. 200 meters, flowers, February 20, 1908, *Williams* 32.

This species is certainly distinct from *Inga eriocarpa*. The flowers in the original specimens in the Gray Herbarium are only in bud, but those of the Williams collection, perfectly developed, are much smaller than in the above species, and besides this the leaflets are distinctly different in shape and mostly 3-jugate.

EXPLANATION OF PLATE 103.—Specimen of *Inga pauciflora* in U. S. National Herbarium, *Williams* 32, cited above. Natural size.



INGA PAUCIFLORA WALP. & DUCHASS.

Inga ursi Pittier, sp. nov.

A tree; branchlets angulate, the younger growth, rachis of the leaves, and peduncles densely ferruginous-hirtous.

Rachis of the leaves winged, 8 to 14 cm. long, the petiolar part narrowly winged, 1.5 to 2.5 cm. long, the wings 7 to 9 mm. broad; stipules lanceolate, ferruginous-hairy, 5 to 10 mm. long, caducous; glands sessile, more or less triangular or transversely compressed; leaflets 5 or 6-jugate, coriaceous, more or less oblique, subsessile or the densely ferruginous-hairy petiolules less than 1 mm. long; leaflet blades ovate-oblong or ovate-elliptic, rounded at the base, obtuse or acute at the apex, sparsely hairy or glabrescent and lustrous above, reticulate and more or less brownish-tomentose beneath, the costa and veins ferruginous-hairy, very prominent beneath, the veins impressed on the upper face; blades of the basal pair of leaflets 4 to 7 cm. long, 1.5 to 3 cm. broad, those of the terminal pair 7 to 10.5 cm. long, 3 to 4 cm. broad.

Floral spikes single, geminate, or 3-clustered in the upper axils, the peduncles terete, 1.5 to 4.5 cm. long, the flower heads elongate, densely flowered; bractlets small, ovate, acute, caducous; flowers sessile; calyx tubular, ferruginous-tomentellous or hirtellous, 12.7 to 13.3 (13) mm. long, the teeth acute, 2 to 3.5 mm. long; corolla tubular, hardly broader at the apex, densely brownish-villous, 18.3 to 20.8 (19.5) mm. long, the lobes narrow, 3 to 4 mm. long; staminal tube included; pistil about 5 cm. long; ovary stipitate, 2-sulcate.

Legume not known.

Type in the John Donnell Smith Herbarium, collected in Colombia, at a point not stated but probably in the vicinity of Popayán, by F. C. Lehmann (no. 5750).

Known among the natives as "guavo de oso," this species may belong to the group of *Inga insignis* Kunth. The cross section of the ovary, however, though almost quadrangular, is not 4-sulcate, as is generally the case among the Tetragonae.

Inga xalapensis Benth. Lond. Journ. Bot. 4: 616. 1845.

A small tree; branchlets slender, subangulate, the younger parts more or less ferruginous-pubescent.

Rachis of the leaves narrowly winged, densely ferruginous-pubescent at first and then glabrescent, 5 to 12 cm. long (or more), the petiolar part usually wingless but sometimes winged, 1 to 1.5 cm. long; leaflets usually 5-jugate (the pairs sometimes more or fewer), coriaceous, subsessile; glands small or medium-sized, prominent, concave; leaflet blades ovate or oblong to lanceolate, rounded at the base, obtuse or acute and often mucronate at the apex, sparsely pubescent or glabrescent and sublustrous above, the slightly prominent costa and the impressed, delicate veins more or less densely ferruginous-pubescent, beneath reticulate and densely soft-pubescent to glabrescent, the costa and veins very prominent, the blades of the basal pair 2.5 to 3 cm. long, 1 to 1.5 cm. broad, those of the terminal pair 6 to 9 cm. long, 2 to 3.5 cm. broad, or larger.

Inflorescences more or less densely paniculate at the ends of the branchlets, the spikes usually geminate; peduncles and rachises densely ferruginous-pubescent, the former 2 to 4.5 cm. long; flower heads elongate, the flowers mostly numerous and caducous; bractlets ovate-lanceolate, acute, pubescent without, 5 to 8 mm. long; flowers sessile; calyx tubular, slightly widening toward the apex, densely ferruginous-pubescent, 10.3 to 11.5 (11 mm.) long, the teeth narrow, acute, 3.5 to 4.5 mm. long; corolla tubular, silky-villous, 14.5 to 17.2 (16.1) mm. long, the lobes broad, 1.5 to 3.5 mm. long; staminal tube included, much shorter than the corolla; pistil about 6 cm. long, the ovary sessile, glabrous, about 15-ovulate; stigma capitellate.

Legume densely ferruginous-pubescent, subterete, more or less stipitate, cuspidate at the apex, 10 to 15 cm. long, about 1 cm. broad, the valves narrow between the broad, obscurely sulcate margins.

Founded upon material from Jalapa, State of Veracruz, Mexico, *Linden* 671, of which I have seen no specimens.

MEXICO: Valley of Córdoba, State of Veracruz, flowers, March 12, 1866, *Bourgeau* 2040. Wartenberg, near Tantoyuca, State of Veracruz, flowers and fruits, 1858, *Ervendberg* 10. San Pedro, near Guadalajara, State of Jalisco, flowers, February 25, 1907, *Safford* 1414.

GUATEMALA: Laguna de Amatitlán, flowers, January 20, 1906, *Kellerman* 6374.

COSTA RICA: Desamparados, flowers, June, 1887, *Biolley* (Inst. Fís. Geogr. Costa Rica, no. 1018). Banks of Río Tirribí, near San José, fruits, June, 1891, *Pittier* (Inst. Fís. Geogr. Costa Rica, no. 4258). La Verbená, near San José, in woods, flowers, December, 1894, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 9078).

NOTES ON OLD SPECIES WITH DESCRIPTIONS OF NEW SUBSPECIES.

The species of the section form three distinct groups, the types of which are respectively *Inga vera* Willd., *I. edulis* Mart., and *I. spuria* Humb. & Bonpl.

GROUP OF INGA VERA.

Although Willdenow gives South America as the origin of *Inga vera*, this species seems to be exclusively Antillean, with few related species and subspecies. Among the numerous specimens of continental origin attributed to *I. vera* not one has been found that could safely be acknowledged as belonging to this species. *Inga uraguensis*, of the *I. spuria* group, may represent the nearest approach, but it is itself very variable, most of its forms leaning to the *I. spuria* type, with fruits very distinct from those of the West Indian tree.

The typical *I. vera*, as described by Willdenow, has glabrous leaves, a character which we find to belong only to a few specimens collected in Haiti and Jamaica. In other specimens from the same islands the rachis of the leaves is distinctly ferruginous-puberulous or pubescent, and the pubescence of the calyx, also rusty-colored, is perhaps a little more dense. But all other details agree with the corresponding ones in the glabrous form, from which these specimens could hardly be separated. This latter facies of the species I consider to be *Inga vera typica*. There are two forms so distinct as to deserve subspecific rank.

***Inga vera lamprophylla* Pittier, subsp. nov.**

Inga lamprophylla Wright, in herb.

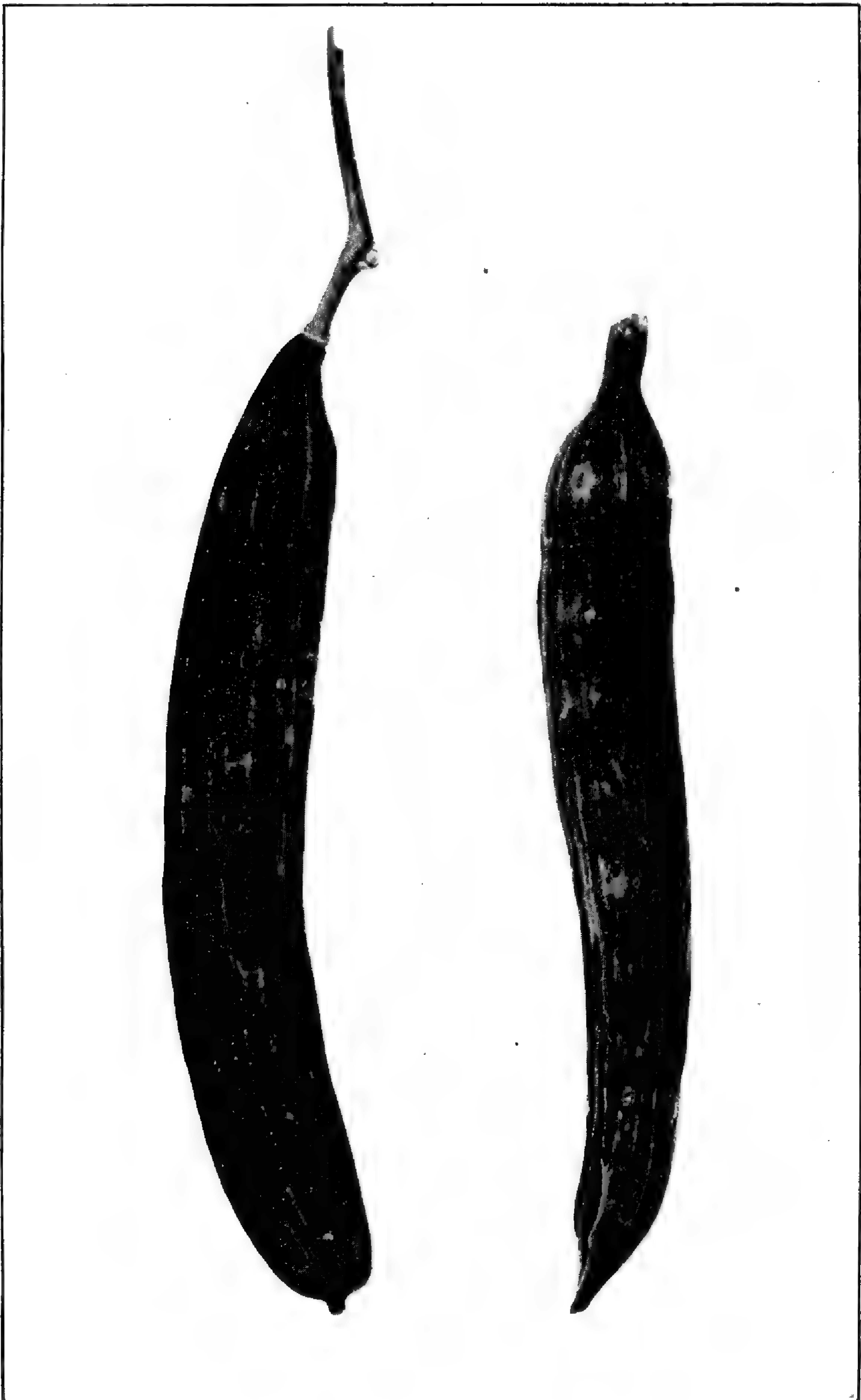
Young growth, rachis of the leaves, and floral peduncles densely ferruginous-pubescent; leaflets, narrow and ending in a long, acute acumen, lustrous above and light green or rusty-colored beneath. As these leaflets are not so broad as in the typical form, they seem to be farther apart. Moreover, the calyx is always stipitate, and often conspicuously so, with the teeth varying in length and breadth and the pubescence also ferruginous.

Type in the U. S. National Herbarium, no. 865550, collected in Haiti, January to March, 1871, by Charles Wright (no. 68).

This subspecies has been collected again by Nash (no. 337) in Haiti and by Britton and Cowell (no. 402) in Porto Rico. Specimens intermediate between



INGA VERA PORTORICENSIS PITTIER.



FRUITS OF *INGA INGOIDES* (A. RICH.) WILLD.

this and *I. vera typica* occur here and there. The facts do not warrant the recognition of this form as a distinct species.

Inga vera portoricensis Pittier, subsp. nov.

PLATE 104.

Flowers of the typical plant, but the leaflets seeming stiffer and more coriaceous, with the costa and veins thicker and very prominent on the lower face; pubescence of the young growth, the rachis of the leaves, and the peduncles ferruginous, but the density of the indument variable; glands varying in size and shape and often obsolete.

Type in the U. S. National Herbarium, no. 362665, collected 40 miles northeast of Mayagüez, Porto Rico, by A. A. Heller (no. 4471).

Apparently endemic to Porto Rico.

In conclusion, it seems that the typical *Inga vera* of Willdenow is an exclusively Antillean species, restricted to the islands of Haiti and Jamaica, and that aberrant forms, the result of isolation, have developed within the area of the species in Cuba, Porto Rico, Haiti, Jamaica, and perhaps Trinidad. These forms, however, have not reached a stage of differentiation sufficiently marked to justify their being considered as distinct species. It is to be noted, moreover, that the 30 specimens at hand all proceed from the above-named islands, to the exclusion of the Lesser Antilles.

EXPLANATION OF PLATE 104.—From a field photograph of *Inga vera portoricensis* taken at Cayey, Porto Rico, in 1899, by Mr. G. N. Collins. Natural size.

GROUP OF INGA EDULIS.

In this group the calyx is long and narrow or short and broad. In the first case, illustrated in *I. edulis*, the flowers are sessile, while in the latter case, represented by *I. ingoides* (illustrated in pl. 105) and *I. subnuda*, they are long-pedicellate. This last character excludes numerous specimens of Central America thus named in our collections. So far as is known, and excepting a specimen of doubtful identification from Bolivia (*Williams* 661, in the New York Botanical Garden Herbarium), *Inga ingoides* is restricted to the Windward Islands, Trinidad, and the adjacent coastal parts of Venezuela and the Guianas.

Inga edulis has a form with a short calyx. Further, this species, *I. oerstediana* Benth., and *I. eriorhachis* insensibly grade into each other in such a way as often to make the identification difficult. The two latter species seem to be simply high altitudinal variations of the former.

EXPLANATION OF PLATE 105.—Two fruits of a Guadeloupe specimen of *Inga ingoides* Willd., in U. S. National Herbarium, collected by Père Duss (no. 3035). Natural size.

GROUP OF INGA SPURIA.

To judge by the existing confusion in the collections consulted, the species of this group, and especially the Central American ones, are very difficult to recognize. Bentham himself seems to have been in doubt more than once as to the standing of some of them, and in his last work on the genus he reduced to synonymy several of his own creating or the work of other authors, two of which, at least, appear to have been well founded.

Inga spuria does not seem to be quite the same thing at both extremes of its vast area of dispersion. Taking the Venezuelan specimens as typical, the species having been described originally from Carúpano, we find, for instance, that they possess a broad, short, stipitate calyx, with triangular, acute, rather short teeth. In Mexican specimens the same part may be narrower and

longer, distinctly broadened at the apex, and hardly, if at all, stipitate; the teeth may also be longer, narrower, and closer together. Similar variations can be observed in the shape, size, and indument of the leaflets, or in the arrangement of other parts, notwithstanding which we find it difficult to discriminate between the specimens, because these variations are combined in every possible way, some characters remaining constant all through the series. Certain forms could be separated, as has been done in other old polymorphic species of the temperate regions, split to-day into no end of so-called new species, but this goes against any rational definition of a specific unit, and besides this we are still in ignorance as to the environmental conditions under which these forms develop.

The reestablished species are *Inga pauciflora* Walp. & Duchass., a well-defined Panama type leaning perhaps to the *I. edulis* group, and *I. eriocarpa* Benth., distinguished from *I. xalapensis* Benth. by its larger flowers and the tomentose indument of the calyx.

LIST OF THE KNOWN SPECIES OF INGA.

The following enumeration includes all the species of *Inga* regarded by the writer as valid, described up to the present date, with indication of the origin of the type. The species marked with an asterisk are those *not* represented in the American herbaria consulted.

Section 1. LEPTINGA.

1. *Inga boliviiana* Britton, Bull. Torrey Club 17: 9. 1890. Bolivia.
2. **brevipes* Benth. Journ. Bot. Hook. 2: 144. 1840. British Guiana.
3. **cynometrifolia* Harms, Verh. Bot. Ver. Brand. 48: 158. 1907. Peru.
4. *flagelliformis* (Vell.) Mart. Flora 20: Beibl. 112. 1837. Brazil.
5. **graciliflora* Benth. Lond. Journ. Bot. 4: 582. 1845. British Guiana.
6. *heterophylla* Willd. Sp. Pl. 4: 1020. 1806. Brazil.
7. **lallensis* Spruce; Benth. Trans. Linn. Soc. 30: 603. 1875. Peru.
8. *lateriflora* Miquel, Linnaea 19: 131. 1847. Surinam.
9. *mapiriensis* Pittier, above, p. 174. Bolivia.
10. *maxoniana* Pittier, above, p. 174. Venezuela.
11. *myriantha* Poepp. & Endl. Nov. Gen. & Sp. 3: 77. *pl.* 289. 1845. Peru.
12. *panurensis* Spruce; Benth. Trans. Linn. Soc. 30: 602. 1875. Brazil.
13. **pardoana* Harms, Bot. Jahrb. Engler 42: 89. 1908. Peru.
14. *portobellensis* Beurling, Svensk. Vet. Akad. Handl. 1854: 122. 1856. Panama.
15. *quaternata* Poepp. & Endl. Nov. Gen. & Sp. 3: 79. 1845. Peru.
16. *roussoviana* Pittier, above, p. 175. Panama.
17. *saffordiana* Pittier, above, p. 176. Panama.
18. *sciadion* Steud. Flora 26: 758. 1843. Cayenne, French Guiana.
19. *sellowiana* Benth. Lond. Journ. Bot. 4: 583. 1845. Brazil.
20. *sertulifera* DC. Prodr. 2: 436. 1825. *Brazil.
21. *tarapotensis* Spruce; Benth. Trans. Linn. Soc. 30: 609. 1875. Peru.
22. *umbellifera* (Vahl) Steud.; DC. Prodr. 2: 432. 1825. French Guiana.
23. **umbratica* Poepp. & Endl. Nov. Gen. & Sp. 3: 77. 1845. Peru.
24. *virgultosa* (Vahl) Desv. Ann. Sci. Nat. 9: 426. 1826. French Guiana.
25. *williamsii* Pittier, above, p. 176. Panama.
26. **wittiana* Harms, Verh. Bot. Ver. Brand. 48: 161. 1907. Brazil.

Section 2. **DIADEMA.**

- 27. *Inga* **bullata* Benth. Lond. Journ. Bot. 4: 607. 1845. Brazil.
- 28. **campanulata* Benth. Trans. Linn. Soc. 30: 607. 1875. Brazil.
- 29. *cinnamomea* Spruce; Benth. Trans. Linn. Soc. 30: 609. 1875. Brazil.
- 30. *cordistipula* Mart. Flora 20: Beibl. 111. 1837. Brazil.
- 31. *darienensis* Seem. Bot. Voy. Herald 117. *pl.* 23. 1853. Colombia.
- 32. *diadema* (Vell.) Mart. Flora 20: Beibl. 114. 1837. Brazil.
- 33. *duckei* Huber, Bol. Mus. Goeldi 5: 375. 1909. Brazil.
- 34. *jinicuil* Schlecht. Linnaea 12: 559. 1838. Mexico.
- 35. **lanceaefolia* Benth. Trans. Linn. Soc. 30: 606. 1875. Brazil.
- 36. **lentiscifolia* Benth. Lond. Journ. Bot. 4: 592. 1845. Brazil.
- 37. **membranacea* Benth. Trans. Linn. Soc. 30: 606. 1875. Panama.
- 38. **nutans* (Vell.) Mart. Flora 20: Beibl. 114. 1837. Brazil.
- 39. *paterno* Harms, Repert. Nov. Sp. Fedde 13: 419. 1914. El Salvador.
- 40. *peckii* Robinson, Proc. Amer. Acad. 49: 502. 1913. British Honduras.
- 41. *radians* Pittier, above, p. 178. Mexico.
- 42. *rusbyi* Pittier, above, p. 179. Bolivia.
- 43. **schinifolia* Benth. Lond. Journ. Bot. 4: 584. 1845. Brazil.
- 44. **sodiroi* Harms, Repert. Nov. Sp. Fedde 13: 527. 1915. Ecuador.
- 45. *stipularis* DC. Mém. Legum. 440. 1825. French Guiana.

Section 3. **BOURGONIA.**

- 46. *Inga* *aggregata* Don, Hist. Dichl. Pl. 2: 391. 1832. Peru.
- 47. *alba* (Swartz) Willd. Sp. Pl. 4: 1013. 1806. French Guiana.
- 48. *bangii* Harms, Repert. Nov. Sp. Fedde 13: 525. 1915. Bolivia.
- 49. *bourgoni* (Aubl.) DC. Prodr. 2: 434. 1825. French Guiana.
- 50. **brachyrhachis* Harms, Verh. Bot. Ver. Brand. 48: 159. 1907. Peru.
- 51. **coruscans* (Poir.) Humb. & Bonpl.; Willd. Sp. Pl. 4: 1017. 1806.
South America (Colombia?).
- 52. *cylindrica* (Vell.) Mart. Flora 20: Beibl. 114. 1837. Brazil.
- 53. *fagifolia* (L.) Willd.; Benth. Trans. Linn. Soc. 30: 607. 1875. British
Guiana(?).
- 54. *laurina* (Swartz) Willd. Sp. Pl. 4: 1018. 1806. St. Kitts.
- 55. *marginata* Willd. Sp. Pl. 4: 1015. 1806. Venezuela.
- 56. **pezizifera* Benth. Lond. Journ. Bot. 4: 587. 1845. British Guiana.
- 57. **tenuifolia* Benth. Lond. Journ. Bot. 4: 587. 1845. Brazil.
- 58. **tenuirama* Harms, Repert. Nov. Sp. Fedde 13: 527. 1915. Ecuador.
- 59. *tomentosa* Benth. Trans. Linn. Soc. 30: 609. 1875. Peru.

Section 4. **PSEUDINGA.**Series 1. **GLABRIFLORAE.**

- 60. *Inga* *capitata* Desv. Journ. de Bot. 3: 71. 1814. Brazil.
- 60a. *brevicalyx* Benth. in Mart. Fl. Bras. 15²: 476. 1876. Brazil.
- 60b. *tenuior* Benth. loc. cit. Brazil.
- 61. *microcalyx* Spruce; Benth. Trans. Linn. Soc. 30: 611. 1875. Brazil.
- 62. *stenocalyx* Spruce; Benth. Trans. Linn. Soc. 30: 611. 1875. Brazil.

Series 2. GYMNOPODAE.

63. *Inga acrocephala* Steud. Flora 26: 759. 1843. Surinam.
64. *aestuariorum* Pittier, above, p. 183. Costa Rica.
65. *cycladenia* Pittier, above, p. 184. Colombia.
66. *dominicensis* Benth. Trans. Linn. Soc. 30: 612. 1875. Dominica.
67. **dumosa* Benth. Trans. Linn. Soc. 30: 612. 1875. Brazil.
68. **gracilior* Sprague, Trans. Bot. Soc. Edinburgh 22: 431. 1904. Colombia.
69. **juglandifolia* (Poir.) Willd. Sp. Pl. 4: 1018. 1806. Venezuela.
70. *latipes* Pittier, above, p. 183. Costa Rica.
71. *lelocalycina* Benth. Lond. Journ. Bot. 4: 598. 1845. British Guiana.
72. **lenticellata* Benth. Trans. Linn. Soc. 30: 613. 1875. Brazil.
73. *leptoloba* Schlecht. Linnaea 12: 560. 1838. Mexico.
74. **lineata* Benth. Lond. Journ. Bot. 4: 594. 1845. Peru.
75. *martinicensis* Presl, Symb. Bot. 1: 65. pl. 42. 1832. Martinique.
76. *mathewsiana* Benth. Lond. Journ. Bot. 4: 594. 1845. Peru.
77. **maynensis* Benth. Trans. Linn. Soc. 30: 613. 1875. Peru.
78. **monzonensis* Harms, Bot. Jahrb. Engler 42: 88. 1908. Peru.
79. *multijuga* Benth. Trans. Linn. Soc. 30: 615. 1875. Panama.
80. *myriocephala* Pittier, above, p. 184. Bolivia.
81. *nobilis* Willd. Enum. Pl. 1047. 1809. Brazil.
82. *olivacea* Sprague, Trans. Bot. Soc. Edinburgh 22: 430. 1904. Colombia.
83. *peltadenia* Harms, Verh. Bot. Ver. Brand. 48: 160. 1907. Peru.
84. *pinetorum* Pittier, above, p. 185. British Honduras.
85. *popayanensis* Pittier, above, p. 185. Colombia.
86. *punctata* Willd. Sp. Pl. 4: 1016. 1806, excl. syn. Martinique.
87. *rufinervis* Spruce; Benth. Trans. Linn. Soc. 30: 612. 1875. Brazil.
88. *ruiziana* Don, Hist. Dichl. Pl. 2: 391. 1832. Peru.
89. *semiglabra* Pittier, above, p. 186. Ecuador.
90. *strigillosa* Spruce; Benth. Trans. Linn. Soc. 30: 612. 1875. Brazil.
91. *thibaudiana* DC. Prodr. 2: 434. 1825. Brazil.

Series 3. PILOSIUSCULAE.

92. *Inga *bonplandiana* H. B. K. Nov. Gen. & Sp. 6: 288. 1823. Peru.
93. **chartacea* Poepp. & Endl. Nov. Gen. & Sp. 4: 79. 1845. Peru.
94. *cobanensis* Pittier, above, p. 188. Guatemala.
95. *densiflora* Benth. Trans. Linn. Soc. 30: 617. 1875. Peru.
96. *hayesii* Benth. loc. cit. Panama.
97. *hostmannii* Pittier, above, p. 188. Surinam.
98. *langlassei* Pittier, above, p. 189. Colombia.
99. *longipes* Benth. loc. cit. Peru.
100. *macrantha* J. R. Johnson, Proc. Amer. Acad. 40: 687. 1905. Venezuela.
101. *maritima* Benth. Lond. Journ. Bot. 4: 601. 1845. Brazil.
102. *melchiana* Harms, Repert. Nov. Sp. Fedde 13: 525. 1915. Guatemala.
103. *mollifoliola* Pittier, above, p. 189. Costa Rica.
104. *monticola* Pittier, above, p. 190. Panama.
105. *nitida* (Poir.) Willd. Sp. Pl. 4: 1013. 1806. Brazil.

- 106. *Inga nuda* Salzm. Lond. Journ. Bot. 4: 607. 1845. Brazil.
- 107. *organensis* Pittier, above, p. 191. Brazil.
- 108. *pilosiuscula* Desv. Journ. de Bot. 1: 71. 1814. French Guiana.
- 109. *pringlei* Harms, Repert. Nov. Sp. Fedde 13: 526. 1915. Mexico.
- 110. **rhabdotocalyx* Harms, loc. cit. Ecuador.
- 111. **salzmanniana* Benth. Lond. Journ. Bot. 4: 608. 1845. Brazil.
- 112. **sanctae-annae* Moore, Trans. Linn. Soc. II. Bot. 4: 350. 1895. Brazil.
- 113. *setifera* DC. Prodr. 2: 432. 1825. Brazil.
- 114. *sordida* Pittier, above, p. 191. Colombia.
- 115. *splendens* (Poir.) Willd. Sp. Pl. 4: 1017. 1806. Brazil.
- 116. *stenopoda* Pittier, above, p. 192. Bolivia.
- 117. *stenoptera* Benth. Journ. Bot. Hook. 2: 143. 1840. Brazil.
- 118. *tuerckheimii* Pittier, above, p. 192. Guatemala.
- 119. *ulei* Harms, Verh. Bot. Ver. Brand. 48: 161. 1907. Brazil.
- 120. *virescens* Benth. Lond. Journ. Bot. 4: 605. 1845. Brazil.

Series 4. LEPTANTHAE.

- 121. *Inga acuminata* Benth. Lond. Journ. Bot. 4: 600. 1845. Trinidad.
- 122. *ciliata* Presl, Symb. Bot. 2: 11. pl. 58. 1833. Brazil.
- 123. *disticha* Benth. Journ. Bot. Hook. 2: 143. 1840. British Guiana.
- 124. *leptantha* Benth. Lond. Journ. Bot. 4: 603. 1845. Brazil.
- 125. **platyptera* Benth. Lond. Journ. Bot. 4: 602. 1845. Brazil.
- 126. *striata* Benth. op. cit. 4: 608. Brazil.

Series 5. LONGIFLORAE.

- 127. *Inga feuillei* DC. Prodr. 2: 433. 1825.
- 128. *lomatophylla* (Benth.) Pittier, above, p. 195. Brazil.
- 129. **longiflora* Spruce; Benth. Trans. Linn. Soc. 30: 620. 1875. Brazil.
- 130. *micradenia* Spruce; Benth. loc. cit. Brazil.
- 131. *mucuna* Walp. & Duchass. Walp. Ann. Bot. 2: 459. 1851-52. Panama.
- 132. *negrensis* Spruce; Benth. Trans. Linn. Soc. 30: 621. 1875. Brazil.
- 133. *plumifera* Spruce; Benth. loc. cit. Brazil.
- 134. **poeppigiana* Benth. Lond. Journ. Bot. 4: 602. 1845. Peru.
- 135. *speciosa* Spruce; Benth. Trans. Linn. Soc. 30: 620. 1875. Brazil.
- 136. *velutina* (Poir.) Willd. Sp. Pl. 4: 1014. 1806. Brazil.

Series 6. CALOCEPHALAE.

- 137. *Inga *brachyptera* Benth. Lond. Journ. Bot. 4: 610. 1845. Colombia.
- 138. **bracteosa* Benth. op. cit. 4: 609. British Guiana.
- 139. *eggersii* Harms, Bot. Jahrb. Engler 42: 88. 1908. Ecuador.
- 140. *expansa* Rusby, Bull. N. Y. Bot. Gard. 8: 90. 1912. Bolivia.
- 141. *goldmanii* Pittier, above, p. 198. Panama.
- 142. *hartii* Urban, Symb. Antill. 1: 311. 1899. Trinidad.
- 143. **heteroptera* Benth. Lond. Journ. Bot. 4: 611. 1845. Colombia.
- 144. **lindeniana* Benth. op. cit. 4: 608. Mexico.
- 145. **macrophylla* (Poir.) Humb. & Bonpl.; Willd. Sp. Pl. 4: 1015. 1806. Peru.
- 146. *obtusata* Spruce; Benth. Trans. Linn. Soc. 30: 621. 1875. Brazil.

- 147. *Inga panamensis* Seem. Bot. Voy. Herald 117. 1853. Panama.
- 148. **pavoniana* Don, Hist. Dichl. Pl. 2: 388. 1832. Peru.
- 149. *purpusii* Pittier, above, p. 199. Mexico.
- 150. **rufiseta* Benth. Trans. Linn. Soc. 30: 621. 1875. Peru.
- 151. *rugosa* Rusby, Bull. N. Y. Bot. Gard. 4: 350. 1907. Bolivia.
- 152. *?sapindoides* (Poir.) Willd. Sp. Pl. 4: 1012. 1806. Venezuela.
- 153. *spectabilis* (Vahl) Willd. op. cit. 4: 1017. Colombia.
- 154. **weberbaueri* Harms, Bot. Jahrb. Engler 42: 90. 1908. Peru.

Series 7. VULPINAE.

- 155. *Inga balaensis* Pittier, above, p. 201. Ecuador.
- 156. *barbata* Benth. Lond. Journ. Bot. 4: 604. 1845. Brazil.
- 157. **blanchetiana* Benth. Trans. Linn. Soc. 30: 624. 1875. Brazil.
- 158. *chrysotricha* Pittier, above, p. 202. Bolivia.
- 159. *codonantha* Pittier, above, p. 202. Colombia.
- 160. *cookii* Pittier, above, p. 203. Guatemala.
- 161. **fastuosa* (Jacq.) Willd. Sp. Pl. 4: 1014. 1806. Venezuela.
- 162. **ferrugineo-hirta* Mart.; Benth. Trans. Linn. Soc. 30: 625. 1875. Brazil.
- 163. **guilleminiana* Benth. Lond. Journ. Bot. 4: 605. 1845. Brazil.
- 164. *hirsutissima* Rusby, Bull. N. Y. Bot. Gard. 4: 349. 1907. Bolivia.
- 165. **hispidula* Schott; Benth. Trans. Linn. Soc. 30: 625. 1875. Brazil.
- 166. **multicaulis* Spruce; Benth. op. cit. 30: 624. Ecuador.
- 167. *sessilis* (Vell.) Mart. Flora 20: Beibl. 114. 1837. Brazil.
- 168. **setosa* Don, Hist. Dichl. Pl. 2: 388. 1832. Peru.
- 169. *tonduzii* Donn. Smith, Bot. Gaz. 44: 112. 1907. Costa Rica.
- 170. **venosa* Griseb. Fl. Brit. W. Ind. 711. 1864, name only. Trinidad.
- 171. **vestita* Benth. Lond. Journ. Bot. 4: 604. 1845. Brazil.
- 172. **villosissima* Benth. Trans. Linn. Soc. 30: 624. 1875. Venezuela.
- 173. *vulpina* Mart.; Benth. Trans. Linn. Soc. 30: 625. 1875. Brazil.

Series 8. DYSANTHAE.

- 174. *Inga cayennensis* Sagot; Benth. Trans. Linn. Soc. 30: 626. 1875. French Guiana.
- 175. *dysantha* Benth. loc. cit. Brazil.
- 176. *standleyana* Pittier, above, p. 204. Panama.

Section 5. EUINGA.

Series 1. TETRAGONAE.

- 177. *Inga biolleyana* Pittier, above, p. 207. Costa Rica.
- 178. **fendleriana* Benth. Trans. Linn. Soc. 30: 630. 1875. Venezuela.
- 179. *insignis* Kunth, Mimos. Pl. Légum. 43. *pl. 13*. 1819-24. Ecuador.
- 180. *jimeneziana* Pittier, above, p. 208. Costa Rica.
- 181. *pittieri* Micheli, Bull. Herb. Boiss. 2: 446. *pl. 13*. 1894. Costa Rica.
- 182. *preussii* Harms, Repert. Nov. Sp. Fedde 13: 420. 1914. El Salvador.
- 183. *rensoni* Pittier, above, p. 209. El Salvador.
- 184. *rodrigueziana* Pittier, above, p. 209. Guatemala.

Series 2. **SULCATAE.**

185. *Inga adenophylla* Pittier, above, p. 210. Bolivia.
 186. *affinis* DC. Prodr. 2: 433. 1825. Brazil.
 187. **bahiensis* Benth. Lond. Journ. Bot. 4: 618. 1845. Brazil.
 188. *cocleensis* Pittier, above, p. 211. Panama.
 189. **conferta* Benth. Lond. Journ. Bot. 4: 620. 1845. Peru.
 190. *donnell-smithii* Pittier, above, p. 211. Guatemala.
 191. *edulis* Mart. Flora 20: Beibl. 113. 1837. Brazil.
 192. *eriocarpa* Benth. Lond. Journ. Bot. 4: 615. 1845. Mexico.
 193. *eriorhachis* Harms, Repert. Nov. Sp. Fedde 13: 525. 1915. Costa
 194. Rica.
 **fasciculata* Poepp. & Endl. Nov. Gen. & Sp. 3: 79. 1845. Peru.
 195. *fissicalyx* Pittier, above, p. 213. Mexico.
 196. *holtonii* Pittier, above, p. 213. Colombia.
 197. *ingoides* (A. Rich.) Willd. Sp. Pl. 4: 1012. 1806. French Guiana.
 198. **laxiflora* Benth. Lond. Journ. Bot. 4: 617. 1845. Peru.
 199. *luschnathiana* Benth. op. cit. 4: 618. Brazil.
 200. *meissneriana* Miquel, Stirp. Surinam. 2. 1850. Surinam.
 201. *oerstediana* Benth. in Seem. Bot. Voy. Herald 117. 1853. Costa Rica.
 202. *pallida* Rusby, Mem. Torrey Club 6: 30. 1896. Bolivia.
 203. *pauciflora* Walp. & Duchass. Linnaea 23: 746. 1850. Panama.
 204. **rubiginosa* (A. Rich.) DC. Prodr. 2: 434. 1825. French Guiana.
 205. *scabriuscula* Benth. Lond. Journ. Bot. 4: 606. 1845. Surinam.
 206. *spuria* (Poir.) Humb. & Bonpl.; Willd. Sp. Pl. 4: 1011. 1806. Vene-
 zuela.
 207. *subnuda* Salzm.; Benth. Lond. Journ. Bot. 4: 613. 1845. Brazil.
 208. *uraguensis* Hook. & Arn. Bot. Misc. Hook. 3: 202. 1833. Uruguay.
 209. *ursi* Pittier, above, p. 215. Colombia.
 210. *vera* Willd. Sp. Pl. 4: 1010. 1806. West Indies.
 210a. *lamprophylla* Pittier, above, p. 216. Haiti.
 210b. *portoricensis* Pittier, above, p. 217. Porto Rico.
 211. **vismiaefolia* Poepp. & Endl. Nov. Gen. & Sp. 3: 79. 1845. Peru.
 212. *xalapensis* Benth. Lond. Journ. Bot. 4: 616. 1845. Mexico.

INDEX.

[Synonyms in *italic*. Page numbers of principal entries in heavy-face type.]

	Page.
Bourgonia (section)-----	181, 219
Calocephalae (series)---	195, 198, 205, 221
Caulanthos (section)-----	181
Cuajiniquill-----	178
Cujín-----	207
Cujiniquill-----	207
Diadema (section)-----	178, 181, 219
Dysanthae (series)-----	204, 222
Euinga (section)-----	197, 205, 222
Glabriflorae (series)-----	181, 182, 219
Guabito peludo-----	205
Guamo-----	197
de hierro-----	175
Guavo-----	197
de oso-----	215
Gymnopodae (series)-----	188, 220
Inga-----	181, 197
acrocephala-----	184, 185, 220
acuminata-----	195, 221
adenophylla-----	210, 223
aestuariorum-----	188, 187, 220
affinis-----	223
aggregata-----	182, 219
alba-----	182, 219
bahiensis-----	223
balaensis-----	201, 202, 222
bangii-----	219
barbata-----	202, 222
billbergiana-----	181
blolleyana-----	207, 222
blanchetiana-----	222
boliviana-----	218
bonplandiana-----	220
bourgoni-----	181, 182, 219
brachyptera-----	221
brachyrachis-----	219
bracteosa-----	221
brevipes-----	218
bullata-----	219
campanulata-----	219
capitata-----	182, 219
brevicalyx-----	219
tenulor-----	219
cayennensis-----	222
chartacea-----	191, 220
chrysotricha-----	202, 203, 222
ciliata-----	221
cinnamomea-----	181, 219
cobanensis-----	188, 220
cocleensis-----	211, 223
codonantha-----	202, 222
condition of knowledge-----	173
conferta-----	223
cookii-----	208, 222

	Page.
Inga cordistipula---	177, 178, 180, 181, 219
group-----	178
coruscans-----	219
cumingiana-----	197
cycladenia-----	184, 220
cylindrica-----	219
cynometrifolia-----	218
darlenensis-----	219
densiflora-----	190, 191, 192, 220
diadema-----	219
disticha-----	221
dominicensis-----	220
donnell-smithii-----	211, 223
duckel-----	181, 219
dumosa-----	220
dysantha-----	205, 222
edulis-----	188, 193, 205, 216, 217, 223
group-----	218
eggersii-----	221
eriocarpa-----	212, 213, 214, 218, 223
eriorachis-----	211, 217, 223
expansa-----	221
fagifolia-----	219
fasciculata-----	223
fastuosa-----	222
fendleriana-----	205, 222
ferrugineo-hirta-----	222
feuillei-----	197, 221
fissicalyx-----	218, 223
flagelliformis-----	218
fulgens-----	199
future publication by Mr. Pittier-----	174
globulifera-----	181
goldmanii-----	198, 201, 221
graciliflora-----	218
gracilior-----	220
guilleminiana-----	202, 222
hartii-----	195, 221
hayesii-----	193, 194, 220
heterophylla-----	174, 218
heteroptera-----	221
hirsutissima-----	194, 203, 222
hispidia-----	222
holtonii-----	218, 214, 223
hostmannii-----	188, 220
ingoides-----	214, 217, 223
insignis-----	205, 207, 210, 214, 222
group-----	215
jimeneziana-----	208, 222
jinicuil-----	180, 219
juglandifolia-----	220
lallensis-----	177, 218
lamprophylla-----	216
lanceaefolia-----	219

	Page.		Page.
<i>Inga langlassei</i> -----	189, 220	<i>Inga pittieri</i> ----	201, 205, 206, 209, 210, 222
<i>lateriflora</i> -----	218	<i>platyptera</i> -----	221
<i>latipes</i> -----	188, 220	<i>plumifera</i> -----	221
<i>laurina</i> -----	182, 219	<i>poeppigiana</i> -----	196, 221
<i>lelocalycina</i> -----	187, 220	<i>popayanensis</i> -----	185, 220
<i>lenticellata</i> -----	220	<i>portobellensis</i> -----	177, 218
<i>lentiscifolia</i> -----	219	<i>preussii</i> -----	205, 207, 209, 222
<i>leptantha</i> -----	193, 221	<i>pringlei</i> -----	193, 221
<i>leptoloba</i> -----	187, 188, 220	<i>pruriens</i> -----	211
<i>leptopoda</i> -----	184, 185	<i>punctata</i> -----	187, 220
<i>lindeniana</i> -----	196, 197, 198, 201, 221	<i>purpusii</i> -----	199, 222
<i>lineata</i> -----	220	<i>quaternata</i> -----	176, 218
<i>lomatophylla</i> -----	195, 221	group-----	175
<i>longiflora</i> -----	221	<i>radlans</i> -----	177, 178, 179, 180, 181, 219
<i>longipes</i> -----	194, 220	<i>rensoni</i> -----	207, 209, 222
<i>lucida</i> -----	199	<i>rhabdotocalyx</i> -----	221
<i>luschnathiana</i> -----	223	<i>rodrigueziana</i> -----	209, 222
<i>macrantha</i> -----	220	<i>roussoviana</i> -----	175, 218
<i>macrophylla</i> -----	221	<i>rubiginosa</i> -----	211, 223
<i>mapiriensis</i> -----	174, 218	<i>rufescens</i> -----	181
<i>marginata</i> -----	182, 219	<i>rufinervis</i> -----	184, 220
group-----	182	<i>rufseta</i> -----	222
<i>maritima</i> -----	194, 220	<i>rugosa</i> -----	222
<i>martinicensis</i> -----	220	<i>ruiziana</i> -----	187, 188, 220
<i>mathewsiana</i> -----	220	<i>rusbyi</i> -----	179, 219
<i>maxoniana</i> -----	174, 218	<i>saffordiana</i> -----	176, 218
<i>maynensis</i> -----	220	<i>salzmanniana</i> -----	221
<i>meissneriana</i> -----	223	<i>sanctae-annae</i> -----	221
<i>membranacea</i> -----	219	<i>sapindoides</i> -----	222
<i>michelliana</i> -----	193, 194, 220	<i>scabriuscula</i> -----	223
<i>micradenia</i> -----	221	<i>schinifolia</i> -----	219
<i>microcalyx</i> -----	219	<i>sciadion</i> -----	218
<i>mollifoliola</i> -----	189, 193, 220	<i>sellowiana</i> -----	177
<i>monticola</i> -----	190, 220	<i>semiglabra</i> -----	186, 220
<i>monzonensis</i> -----	220	<i>sertulifera</i> -----	178, 218
<i>mucuna</i> -----	196, 198, 201, 221	<i>sessilis</i> -----	202, 205, 222
<i>multicaulis</i> -----	202, 222	<i>setifera</i> -----	221
<i>multijuga</i> -----	187, 220	<i>setosa</i> -----	202, 222
group-----	183	<i>sodirol</i> -----	219
<i>myriantha</i> -----	178, 218	<i>sordida</i> -----	191, 221
<i>myrlocephala</i> -----	184, 185, 220	<i>speciosa</i> -----	195, 221
<i>negrensis</i> -----	221	<i>lomatophylla</i> -----	195
<i>nitida</i> -----	220	<i>spectabilis</i> -----	199, 200, 201, 222
<i>nobilis</i> -----	186, 220	<i>splendens</i> -----	189, 221
<i>nuda</i> -----	221	<i>spuria</i> -----	197, 212, 216, 217, 223
<i>nutans</i> -----	219	group-----	214
<i>obtusata</i> -----	221	<i>standleyana</i> -----	204, 222
<i>oerstediana</i> -----	217, 223	<i>stenocalyx</i> -----	219
<i>olivacea</i> -----	220	<i>stenopoda</i> -----	192, 221
<i>organensis</i> -----	191, 221	<i>stenoptera</i> -----	221
<i>ornata</i> -----	214	<i>stipularis</i> -----	181, 219
<i>pachycarpa</i> -----	214	<i>striata</i> -----	193, 221
<i>pallida</i> -----	223	<i>strigillosa</i> -----	220
<i>panamensis</i> -----	199, 200, 207, 222	<i>subnuda</i> -----	217, 223
<i>panurensis</i> -----	174, 218	<i>tarapotensis</i> -----	177, 218
<i>pardoana</i> -----	218	<i>tenuifolia</i> -----	219
<i>paterno</i> -----	177, 178, 179, 180, 181, 219	<i>tenuirama</i> -----	219
<i>pauciflora</i> -----	214, 218, 223	<i>thibaudiana</i> -----	187, 220
<i>pavoniana</i> -----	222	<i>tomentosa</i> -----	219
<i>peckii</i> -----	219	<i>tonduzii</i> -----	222
<i>peltadenia</i> -----	187, 220	<i>tubulifera</i> -----	181
<i>pezizifera</i> -----	219	<i>tuerckheimii</i> -----	192, 221
<i>pilosiuscula</i> -----	221	<i>ulei</i> -----	221
<i>pinetorum</i> -----	185, 220	<i>umbellifera</i> -----	178, 218

	Page.		Page.
<i>Inga umbratica</i> -----	218	<i>Mimosa</i> -----	199
<i>uraguensis</i> -----	223	<i>alba</i> -----	182
<i>ursi</i> -----	215, 223	<i>spectabilis</i> -----	200
<i>velutina</i> -----	221	Mimoseae, notes by Bentham-----	181
<i>venosa</i> -----	222	Monkey pacal-----	197
<i>vera</i> -----	217, 223	Navo-----	189
<i>lamprophylla</i> -----	216	Pacal-----	197
<i>portoricensis</i> -----	217	<i>de mono</i> -----	197
<i>typica</i> -----	216, 217	<i>monkey</i> -----	197
<i>vestita</i> -----	193, 222	Pacay-----	203
<i>villosissima</i> -----	222	Paterno-----	179, 180
<i>virescens</i> -----	192, 221	Pilosiusculae (series)-----	188, 193, 220
<i>virgultosa</i> -----	218	Pithecolobium-----	174, 181, 182
<i>vismiaefolia</i> -----	223	<i>glomeratum</i> -----	181
<i>vulpina</i> -----	222	<i>rufescens</i> -----	181
<i>weberbaueri</i> -----	222	<i>tubuliferum</i> -----	181
<i>williamsii</i> -----	176, 218	Pseudinga (section)-----	182, 205, 219
<i>wittiana</i> -----	218	Pseudingae-Dysanthae-----	205
<i>xalapensis</i> -----	213, 215, 218, 223	<i>vulpinae</i> -----	204
Leptanthae (series)-----	193, 195, 221	Rousseau, H. H., species named in honor-----	176
Leptinga (section)-----	174, 176, 177, 181, 218	Sulcatae (series)-----	205, 210, 223
Longiflorae (series)-----	195, 196, 202, 205, 221	Tetragonae (series)-----	205, 222
		Vulpinae (series)-----	193, 201, 222



SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

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II

PREFACE:

In the present paper, the sixth of the series, Mr. Henry Pittier puts on record further results of his Colombian and Central American botanical studies. All the species treated are trees or shrubs, and most of them are here described for the first time. One of the new species, *Mimusops darienensis*, is the tree which yields the Panama "balata" or gutta-percha, a very important commercial product. Hitherto this tree has been confused with another species of *Mimusops*, from British Guiana.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

CONTENTS.

	Page.
Introduction	225
Moraceae	225
Two new species of <i>Coussapoa</i>	225
Four new species of <i>Cecropia</i>	226
Proteaceae	228
Three new species of <i>Roupala</i>	228
An imperfectly known species of <i>Embothrium</i>	230
Gaesalpiaceae	231
Two new species of <i>Schizolobium</i>	231
A little known species of <i>Macrolobium</i>	233
Fabaceae	234
New or imperfectly known species of several genera.....	234
Vochysiaceae	237
A species of <i>Vochysia</i> redescribed.....	237
Ochnaceae	238
A species of <i>Cespedesia</i> redescribed.....	238
Combretaceae	238
Two new species of <i>Terminalia</i>	238
The Mexican and Central American species of <i>Combretum</i> , section <i>Micro-</i> <i>petalae</i>	239
Four new or imperfectly known species of <i>Combretum</i> of other sections....	246
Melastomataceae	248
An old and a new species of <i>Miconia</i>	248
Sapotaceae	249
A new species of <i>Mimusops</i>	249
Boraginaceae	251
Seven new species of <i>Cordia</i>	251
Verbenaceae	254
A substitute for a preoccupied name.....	254
Bignoniaceae	254
Four new species of <i>Adenocalymna</i>	254
New species of several genera.....	257
Index	IX

ILLUSTRATIONS.

PLATES.

	Facing page.
PLATE 106. Fruit of <i>Clytostoma isthmicum</i> Pittier.....	260

TEXT FIGURES.

	Page.
FIGURE 98. Perianth of <i>Combretum farinosum</i>	242
99. Perianth of <i>Combretum polystachyum</i>	244
100. Perianth of <i>Combretum benthamianum</i>	246
101. Floral detail of <i>Cordia eriostigma</i>	251
102. Flower and pistil of <i>Cordia trichostyla</i>	252
103. Flower and detail of <i>Cordia acuta</i>	253
104. Flower and pistil of <i>Cordia littoralis</i>	253

NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA—6.¹

BY HENRY PITTIER.

INTRODUCTION.

In this sixth contribution to the Colombian and Central American flora, further new species from recent collections made by myself and others are described and a few old types, hitherto imperfectly known, are redescribed. There is also proposed a new arrangement for a section of the genus *Combretum*.

MORACEAE.

TWO NEW SPECIES OF *COUSSAPOA*.

Coussapoa brevipes Pittier, sp. nov.

An epiphytic shrub; branchlets thick, subterete, glabrescent.

Leaves coriaceous, the petioles glabrous or minutely pubescent, 4 to 6 cm. long, the blades ovate, rounded at the base, obtuse or subacute at the apex, 10 to 17 cm. long, 6.5 to 11 cm. broad, the upper face glabrous, the lower face pulverulent-pubescent, whitish, the costa and veins impressed above, very prominent and evanescent-lanuginous beneath, the veins 12 to 14, running straight to the margins and there connected by a single nerve; venules very slender and inconspicuous; margin sinuate, the sinuses corresponding to the ends of the veins. Stipules obliquely triangular, acute, minutely woolly-pubescent outside, 7 cm. long, 3 cm. broad at the base, caducous.

Male inflorescence not known. Female inflorescences geminate in the upper axils; peduncles 0.5 to 1 cm. long, thick, simple, minutely woolly-pubescent; flower heads globose, about 0.6 cm. in diameter. Flowers surrounded by an involucre of delicate, membranous, palmatifid bractlets, much shorter than the perianth; perianth urceolate, obovoid, about 2 mm. long, abruptly and evenly contracted around the style, the upper exposed part brown-velvety, the lower immersed part glabrous and transparent. Ovary ovoid, glabrous; style short; stigma capitellate, papillose.

Type in the U. S. National Herbarium, no. 679541, collected on the hills of Sperdí, near Puerto Obaldía, San Blas Coast, Panama, growing on *Mimusops darienensis* Pittier, in forest, female flowers only, September 5, 1911, by H. Pittier (no. 4386).

¹ For no. 5 of this series and list of earlier issues see p. 143, this volume.

This species is characterized principally by the short-pedunculate female flower heads and the pulverulent indument of the lower face of the leaves.

***Coussapoa panamensis* Pittier, sp. nov.**

A tree; branchlets terete, glabrous, the younger parts sparsely covered with very short, white, appressed hairs.

Leaves coriaceous, the petioles minutely puberulous or glabrescent, 3.5 to 6.5 cm. long, the blades ovate, rounded at the base, acute or acuminate at the apex, 11 to 18 cm. long, 7.5 to 11 cm. broad, glabrous and more or less muriculate above, felted-canescens beneath; margin sinuate; venation subprominent on the upper face, very prominent on the lower face, the straight primary veins glabrescent or puberulous, anastomosed along the margin, the venules also glabrescent, dark and distinct on the whitish background. Stipules velvety without.

Male inflorescence not known. Female inflorescences single or geminate in the upper axils; peduncles terete, simple, 4 to 5 cm. long, thicker at the apex, minutely pubescent; flower heads depressed-globose, about 1.5 cm. long and 2 cm. in diameter; flowers bractless, densely congested; perianth tubular, thick, about 3 mm. long, minutely puberulous at the apex, the apical pore round; ovary obovoid; style very short; stigma papillose. Drupe ovoid, about 8 mm. long, densely appressed-hairy, surrounded by the loose, accrescent perianth.

Type in the U. S. National Herbarium, no. 678968, collected along Río Fató, Province of Colón, Panama, in forest, female flowers only, July 9, 1911, by H. Pittier (no. 3892).

By the unbranched peduncles of the female inflorescence, this species is related to the South American *C. fontanesiana*, *C. asperifolia*, *C. villosa*, and *C. martiana*, as well as to *C. brevipes* Pittier from the same region in Panama. It differs, however, from each one of them in some details, nor can it be readily identified with any of the other species of Central America. The Central American species of *Coussapoa* are in need of revision.

FOUR NEW SPECIES OF CECROPIA.

***Cecropia arachnoidea* Pittier, sp. nov.**

A tree 5 to 8 meters high, sparingly branched, the branchlets short, undivided, the younger parts densely ferruginous-villous.

Stipules ferruginous-pubescent, about 7 cm. long, the apex twisted into an acute tip. Leaves coriaceous; petioles plurisulcate, more or less ventricose at the base, 22 to 53 cm. long, at first ferruginous-pubescent, glabrescent later, the basal pulvinus brown-velvety; leaf blades 35 to 45 cm. in diameter, scabrous above, whitish-pubescent beneath with the very prominent, puberulous costæ and veins more or less sparsely covered with short white hairs; lobes 8 to 10, parted from one-half to two-thirds of the distance from the center to the apex, broad, obtuse, their margins entire; larger lobe 30 cm. long, 13.5 cm. broad; smallest lobe about 14 cm. long.

Inflorescences pedunculate, the peduncles geminate in the axils, flattened, covered with a minute ferruginous pubescence interspersed with sparse long, white hairs. Spathes white-arachnoid, not contracted at the base, cuspidate, about 5 cm. long. Male inflorescence: peduncles 8.5 cm. long, erect; aments 25 to 30 in the cluster, 2.5 to 4 cm. long, about 2.5 mm. in diameter, on pedicels 0.5 cm. long, villous; perianth tubular or urceolate, flattened at the apex, 1 to 1.2 mm. long, opening by an ovate pore; filaments of the stamens almost terete, the anthers oblong. Female inflorescence: peduncles 7 to 9.5 cm. long, pendulous; aments 3 to 5 together, sessile, 6 to 9 cm. long, nearly 1

cm. in diameter; perianth tubular, 2 to 2.5 mm. long, the upper exposed part flat, filmy-hairy, the pore round, very small; ovary ovate-lenticular, the style short and slender, the stigma capitate, penicillate.

Type in the U. S. National Herbarium, no. 479152, collected near Gamboa, Canal Zone, Panama, in flower, July 23, 1911, by H. Pittier (no. 4056).

Another collection was made at Culebra, Canal Zone, Panama, in flower, July 26, 1911 (*Pittier* 4060).

***Cecropia asperrima* Pittier, sp. nov.**

Leaves coriaceous; petioles 21 to 23 cm. long, 0.5 to 0.7 cm. thick at the base, glabrescent but at first grayish or fuliginous-tomentose; leaf blades peltate, 23 to 30 cm. in diameter, at first sparsely whitish-tomentose, later dark green and very rough above, white-tomentose beneath between the lightly ferruginous-tomentose veins; lobes 8 to 10, divided for more than half their length, the larger ones 15 to 20 cm. long, 6.5 to 9 cm. broad, the smaller ones 7.5 to 8 cm. long.

Inflorescences pedunculate, the peduncles more or less villous; spathes snowy arachnoid tomentose without. Male inflorescence: peduncles about 3.5 cm. long; aments about 25 in the cluster, slender, 3 to 4 cm. long, pedicellate, the pedicels villous, 0.5 cm. long; perianth glabrous, smooth, 2-lobulate. Female inflorescence: peduncles 4 to 8 cm. long; aments 4 or 5 together, sessile, 3 to 5 cm. long, about 0.8 cm. thick, the flowers united by a filmy white tomentum.

Type in the U. S. National Herbarium, no. 41703, collected in Nicaragua, precise locality not stated, by Charles Wright (U. S. North Pacific Exploring Expedition).

OTHER COLLECTIONS:

NICARAGUA: Chinandega, flowers, January 13, 1903, *C. F. Baker* 2007.

COSTA RICA: Nicoya, along roads, flowers, March, 1900, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 13870). Llanos de Turúcares, common in hedges and thickets, flowers, June, 1902, *Pittier* (Inst. Fís. Geogr. Costa Rica, no. 16388).

The type specimen was labeled *C. obtusa* Trécul, but in that species the male aments are 12 to 15 together and about 10 cm. long, the perianth of the male flowers is hirtellous, the female aments are 8 to 9 cm. long and pedicellate, etc.

***Cecropia longipes* Pittier, sp. nov.**

A small tree, sparingly ramified; branchlets undivided, the younger parts densely grayish-hirtous.

Stipules broad, about 9 cm. long, acute, ferruginous, more or less thickly covered with white hairs. Leaves coriaceous; petioles multisulcate, appressed whitish pubescent, 35 to 55 cm. long, 1.2 to 1.4 cm. thick near the base, the pulvinus densely white-villous; leaf blades peltate, about 40 cm. in diameter, the upper face more or less densely covered with stiff, short, erect, white hairs, the lower face felted-canescient with the prominent venation mixed whitish and fuliginous-pubescent; lobes 9, broad, rounded, the sinuses hardly reaching one-third of the distance from center to apex of the blade, the margin entire; largest lobe about 29 cm. long and 15 cm. broad.

Inflorescence pedunculate, the peduncles geminate in the axils of the leaves, flattened, more or less densely whitish-villous. Spathes not known. Male inflorescence: peduncles about 10 cm. long; aments 50 to 60 together, 4 to 12 cm. long, 1 to 2 mm. thick, the clusters on slender hairy pedicels 1 cm. long; perianth tubular or turbinate, angulate, about 0.8 mm. long, the rounded apex thick and bilobate; staminal filaments short, broad and flat, the anthers ovoid. Female inflorescence: peduncles 65 to 70 cm. long; aments 6 in the cluster,

about 10 cm. long and 0.8 cm. thick, densely filmy-hairy, the pedicels (1 to 1.5 cm. long) and receptacle densely arachnoid-hairy; flowers all bound together with a filmy tissue; perianth tubular, about 2 mm. long, the upper part thick and brownish; apical pore very small; ovary ovoid-fusiform, attenuate at both ends; style very slender and short.

Type in the U. S. National Herbarium, no. 678897, collected around Tabernilla, Canal Zone, Panama, in old clearings, male flowers, July 6, 1911, by H. Pittier (no. 3823). The characters of the female inflorescence are drawn from Pittier 3825, from the same locality.

Cecropia longipes is distinguished by having the longest peduncles in both male and female inflorescences of all the Isthmian species of *Cecropia*. It seems to be closely related to *C. ruiziana*. The female peduncles are much longer than in any other hitherto described species.

***Cecropia maxonii* Pittier, sp. nov.**

A tree 10 to 12 meters high, branched above, the younger shoots arachnoid, faintly canescent.

Stipules brownish, sparsely covered with long appressed white hairs. Leaves coriaceous; petiole multisulcate, minutely puberulous, 15 to 25 cm. long, about 8 mm. thick, the pulvinus brown, at first densely grayish-villous; leaf blades peltate, about 25 cm. in diameter, glabrous or roughly muricate-glandular above, canescent between the prominent, pilosulous costæ and veins beneath, 10-lobate, the lobes parted for from one-half to three-fourths of the distance from center to apex, acuminate or obtuse, the margin entire-repand; large lobes 18 cm. long, 8 cm. broad; smaller lobes about 12 cm. long.

Male inflorescences pedunculate, the peduncles 2 or 3 together in the axils, 5 to 6 cm. long, thick, flattened, sparsely covered with minute white hairs. Spathe about 11.5 cm. long, contracted at the base, acute at the apex, dark-colored, very sparsely arachnoid-hairy. Aments 12 to 15 together, pedicellate, the pedicels glabrescent, 0.6 to 1 cm. long. Flowers small, waxy; perianth golden yellow, tubular or turbinate, angulate, 1.2 to 1.5 mm. long, the upper part thicker, glabrous and lustrous, bilobulate, the lobules ciliate, parted by a narrow slit; staminal filaments connate at the base, compressed-fusiform, glabrous; anthers pale yellow, one exserted at a time. Female inflorescence not known.

Type in the U. S. National Herbarium, no. 675493, collected in the vicinity of El Boquete, Chiriquí, Panama, at an altitude of 1,000 to 1,200 meters, male flowers only, March 2 to 8, 1911, by William R. Maxon (no. 5132).

This species is characterized by its very coarse and rather small leaves, as well as by the waxy appearance and yellow color of the male flowers. The whitish, glandlike excrescences of the upper face of the leaves may also be a constant and peculiar character.

PROTEACEAE.

THREE NEW SPECIES OF ROUPALA.

***Roupala darienensis* Pittier, sp. nov.**

A tree 20 to 30 meters high, the young branchlets more or less fulvous-hairy at the base and around the insertion of the leaves, the axillary buds rufous-hairy. Leaves subcoriaceous, flat, distichous, the petioles slender, flattened above, submarginate, 3.5 cm. long, densely rusty or rufous-hairy above, the blades broadly ovate (on adult trees) to narrowly elliptic (on shoots and seedlings), oblique or suboblique, ovate and abruptly attenuate or attenuate-cuneate at the base, short or long-acuminate at the apex, the acumen acute, 6 to 12 cm. long, 3 to 4.5 cm. broad, dark green and obscurely reticulate, the costa sub-

impressed, often pilosulous, and the (4 to 6) main veins prominulous above, glabrous, opaque, more or less rusty-colored, the costa and veins sharply prominent beneath; margin entire or remotely denticulate on the upper half of the blade. Floral rachis slender, about 15 cm. long, brownish-pubescent, axillary at the end of the branchlets; flowers not known. Follicles elliptic, compressed, stipitate, short-mucronate, minutely and sparsely pubescent; pedicel 4 mm., stipe about 7 mm. long; body of the follicle 2.8 to 3.2 cm. long, 1.2 cm. broad; remnant of the style not over 2 mm. long. Seeds (2 in each follicle) cordate, dark brown, minutely pilosulous, surrounded with a membranous, ovate-elliptic, pinkish wing, the whole 2.7 to 2.9 cm. long, about 1 cm. broad.

Type in the U. S. National Herbarium, no. 678256, collected at Cana, southern Darién, Panama, fruits, April to June, 1908, by R. S. Williams (no. 739).

Collected also on the banks of Pirre River, southern Darién, Panama, young shoot only, June, 1914, by H. Pittier (no. 6975).

Roupala darienensis is closely related to a plant of Santa Marta, determined as *R. gardneri* (but certainly not Meisner's species), and to *R. panamensis*. It differs from both in pubescence, length of the spikes, and leaf characters, and from the latter in the large size of the adult tree. See notes under *Roupala panamensis* below.

***Roupala glaberrima* Pittier, sp. nov.**

A tree, entirely glabrous. Leaves entire, thick, flat, coriaceous, the petioles slightly flattened, 2.5 to 3 cm. long, the blades ovate-elliptic, cuneate-attenuate at the base, obtusely acuminate at the apex, 4.5 to 7 cm. long, 2 to 4 cm. broad, lustrous and reticulate above, the costa, veins, and venules slightly prominent, opaque, the costa and veins hardly visible beneath; margins more or less revolute. Racemes axillary or subterminal, the rachis rather thick, 10 to 21 cm. long; flowers numerous; pedicels single or geminate, when the latter free to the base, about 4 mm. long; sepals linear-oblong, rounded at the apex, 12.5 mm. long, 1.3 mm. broad at the broadest place near the apex, the upper margins inflexed (involute), with a beaked mucro at the apex; stamens inserted on the upper half of the sepals, the filaments very short (0.2 to 0.5 mm. long), the anthers linear-oblong, 2.5 to 3.5 mm. long; disc scales 4, ovate, nearly 0.5 mm. long; pistil 11.5 mm. long, the ovary ovoid-oblong, the style clavate and sulcate at the upper part, with a truncate apex.

Type in the U. S. National Herbarium, no. 579863, collected along the Ciruelas River above Barba, Costa Rica, flowers, March 15, 1890, by A. Tonduz (Inst. Ffs. Geogr. Costa Rica, no. 2228).

While in Costa Rica, I identified this specimen, with doubt, as *R. nitida* Rudge, a species of French Guiana, but I now find that it differs from that in the texture and size of the leaves, the proportional length of these and the racemes, the dimensions of the sepals, etc. From *R. loranthoides* Klotzsch, of Guatemala, which, also, is said to be entirely glabrous, it departs in the larger flowers, the shape of the disc scales, and other minor details.

***Roupala panamensis* Pittier, sp. nov.**

A small tree, the young branchlets glabrous or glabrescent. Leaves coriaceous, flat, the petioles 2 to 5 cm. long, thicker at the base, narrowly marginate, flattened above, hairy on the upper side at the base, sparsely scaly, the blades ovate to elliptic, rounded-cuneate and decurrent at the base, long and acutely acuminate at the apex, 6.5 to 11 cm. long, 2.5 to 5 cm. broad, glabrous on both sides, pale green above, paler, minutely punctulate, and reticulate beneath, the main veins (7 or 8) prominent above, the costa, veins, and venules prominent beneath; margins entire on the lower half of the blade, remotely sinuate-toothed or serrate on the upper half. Floral spikes axillary or on defoliate

nodes of the old wood, the rachis slender, suberect, cano-pubescent, 8 to 10 cm. long; flowers numerous, white, geminate, each pair subtended by a minute, ovate, scarious bract covered with red hairs; pedicels free, cano-pubescent, 1.5 to 2 mm. long; sepals linear, 3-nerved, 7.5 mm. long, broader and rounded at the base, truncate at the apex, minutely and sparsely pubescent without; stamens inserted on upper half of the sepals (4.5 mm. from base), glabrous, the filaments 0.5 to 0.6 mm. long, the anthers linear or oblong-linear, 3 mm. long; disc scales ovate or suborbicular, 0.5 to 0.6 mm. high; pistil 8 mm. long, the ovary ovoid, whitish-tomentellous, the style glabrous, clavate, 2-sulcate.

Type in the U. S. National Herbarium, no. 676779, collected between El Corozal and Ancón, Canal Zone, Panama, in a swamp, flowers, February 2, 1911, by H. Pittier (no. 2630).

Owing to the incompleteness of the descriptions of the known species of *Roupala*, it is very difficult to establish the relationship between the many members of the genus. The one just described belongs undoubtedly to the group designated by Meisner¹ as section 2: "Foliis dentatis vel passim integerrimis;" but it does not correspond to any of the descriptions under that head, being characterized by the cano-pubescent pedicels and rachis of the inflorescence, the white tomentellum of the ovary, the small reddish bract at the base of the pedicels, the hairiness at the base of the petioles, etc. It is apparently very closely related to a plant of Santa Marta (*H. H. Smith* 1913, 1914), distributed under the names of *R. gardneri* Meisn.(?) and *R. gardneri dentata* DC.,² but in that the branchlets are stouter, the floral spikes either axillary at the ends of short branchlets or forming large, terminal, branched panicles. The petioles and the length and texture of the leaves are also distinct and the flowers not so slender and perhaps longer than in the Panama species. It is very doubtful whether the Santa Marta plant is the true *R. gardneri*; as stated under *R. darienensis*, I do not think it is. When the range of variation in the specific characters within this genus is better known, it is quite possible that forms that are kept apart for the present may be brought together under one name.

AN IMPERFECTLY KNOWN SPECIES OF EMBOTHRIUM.

Embothrium ruizii (Klotzsch) Pittier.

Oreocallis ruizii Klotzsch, *Linnaea* 20: 474. 1847.

A bushy shrub, the branchlets at first grayish, rusty, or fulvous-tomentellous, glabrous later. Leaves subcoriaceous, bunched at the ends of the branchlets, the petioles grayish-tomentellous, 2 to 2.5 cm. long, the blades oblong, attenuate at the base, rounded-emarginate at the apex, 5 to 9 cm. long, 2 to 4 cm. broad, glabrous and subreticulate above with the costa and veins prominulous, glaucous, sparsely pubescent, and reticulate beneath, the venation brownish, the costa prominent and subtomentellous. Inflorescence spicate, terminal, the rachis thick, brownish-tomentellous, about 4.5 cm. long; flowers numerous, glabrous, whitish or pale greenish white; basal bract acute-triangular, hairy, about 3 mm. long; pedicels thick, about 1 cm. long; perianth about 3.5 cm. long, forming at the apex a 4-lobate head; anthers sessile, subacute, about 2 mm. long and broad, inserted inside of the concave lobes of the perianth; disc lamella brownish, fleshy, half surrounding the base of the pistil; pistil about 4.7 cm. long, the ovary stipitate, hardly thicker than the style, 1-celled, the ovules few,

¹ In DC. Prodr. 14: 427. 1856-57.

² Not De Candolle but Meisner is the author of this name.

with a long funicle, the style curved, the stigma large, umbonate, discoid-oblong, with revolute margins. Follicle woody, glabrous, subglaucous within, ovoid-fusiform, long-stipitate, bearing at the apex the thick, persistent style; dehiscence unilateral; pedicel and stipe each about 1 cm. long; body of the follicle 4 cm. long and 2 cm. in diameter; persistent style about 3 cm. long. Seeds 4 in each follicle, obovate, flat, whitish, 2 to 2.5 cm. long, about 1 cm. broad, including the terminal, membranous, ovate-elongate wing.

Collected at Cariamanga, Ecuador, at an altitude of about 2,400 meters, November 24, 1910, by Dr. C. H. T. Townsend.

Two species of *Embothrium* Forst., section *Oreocallis* R. Br., have been reported from the Ecuadorean Andes, *E. grandiflorum* Lam. and *E. ruizii*. Dr. Townsend's specimens agree fairly with the description of the latter species, which is here emended and supplemented by the description of the fruit and seed.

CAESALPINIACEAE.

TWO NEW SPECIES OF SCHIZOLOBIUM.

Schizolobium covilleum Pittier, sp. nov.

A large, deciduous tree, 25 to 30 meters high, the trunk over 1 meter in diameter. Larger limbs horizontal; crown rounded-depressed. Bark grayish and shaggy on the trunk, brownish and covered with minute lenticels on the branchlets. Heart wood yellow, fine-grained and hard. Younger shoots densely covered with a brown downy pubescence.

Leaves bipinnate, the mature ones (not collected) often very large, the young ones on floriferous branchlets 10 to 20 cm. long. Rachis ferruginous-pubescent or puberulous, the petiolar part of the primary costa 1.5 to 2 cm. long. Pinnæ 15 to 21, opposite or alternate, 19 to 29-foliolate, up to 8 cm. long. Leaflets sessile, alternate, 5 to 10 mm. long, 4 to 5 mm. broad, suborbicular to ovate-elliptic or obovate, obliquely truncate at the base and strongly inequilateral, the insertion being at the lower angle, rounded and often subemarginate or sometimes subacute at the tip, glabrous or sparsely hairy and reticulate above, paler and more or less pubescent beneath. Stipules oblong, rounded at the apex, about 6 mm. long, scarious, ferruginous-hairy, very caducous.

Floral racemes unbranched, 15 to 25 cm. long, axillary and terminal and forming broad panicles at the ends of the branchlets, the rachis, pedicels, and calyx densely ferruginous-pubescent. Bracts and bractlets oblanceolate, 5 to 7 mm. long, ferruginous-hairy, early deciduous. Pedicels slender, 7 to 20 mm. long. Calyx tube broadly cupulate, scarcely oblique; calyx lobes 5, ovate-elliptic, narrowing more or less toward the rounded tip, about 8 mm. long and 5 mm. broad. Petals 5, yellow, unguiculate, suborbicular, 14 mm. long, 12 mm. broad, sparsely dark-dotted toward the middle; claw 2.5 mm. long, glandular-hairy above near the base of the limb, pubescent near the insertion on the receptacle. Stamens 10, nearly 12 mm. long, the filaments densely hairy on the lower half, sparsely glandular-hairy on the upper half, the anthers ovate, about 2 mm. long. Pistil 15 mm. long, densely whitish-pubescent for the lower two-thirds of its length, gradually glabrescent toward the tip; ovary sessile, short, few-ovulate, attenuate into a long style; stigma obtuse and small.

Legume obovate-oblique, long-attenuate, stipitate, about 9.5 cm. long and 3.2 cm. broad, 1-seeded, the valves coriaceous, glabrous and smooth without, strongly reticulate within. Seed ovate, strongly compressed, 2.3 cm. long, 1.5 cm. broad.

Type in the U. S. National Herbarium, no. 715287, collected along a dry river in the neighborhood of Pocrí, near Aguadulce, Province of Coclé, Panama, at

about 40 meters above sea level, flowers, December 9, 1911, by H. Pittier (no. 5105).

OTHER COLLECTIONS:

PANAMA: Near Empire, Canal Zone, *Hayes* 584. Río Abajo, on the road between Las Sabanas and Old Panama, flowers, January, 1915, *Pittier* 6916. Quebrada Honda, near Pinogana, southern Darién, fruits, April, 1914, *Pittier* 7003.

Bentham¹ considered this species very similar to *Schizolobium excelsum* Vog., but questioned its standing on account of the absence of fruit. The characters of the leaves and flowers are quite sufficient, however, to show that the Panama tree belongs to a distinct species. Its racemes are shorter, the flowers a little smaller, the petals broader, glabrous, and marked with numerous dots between the delicate brown veins; the claw is not only pubescent, but covered on its upper part with short, stiff, glandular hairs; the filaments are covered with the same kind of indument; and the pubescence on the pistil is not dark brown ("atro-fusca") but quite white. In *Schizolobium excelsum* the inflorescences and leaves are much larger, the pinnæ are all opposite, and the leaflets are larger, much less oblique, and petiolulate.

Named for Mr. Frederick V. Coville, Curator of the United States National Herbarium, whose constant interest in floristic investigations has contributed immensely to the success of the botanical survey of Panama.

***Schizolobium kellermanii* Pittier, sp. nov.**

A large tree.

Leaves bipinnate, the main costa thick, angular, about 25 cm. long, glabrescent, the petiolar part 7.5 cm. long; pinnæ 20, paired and inserted side by side on the upper part of the main costa, the rachis 15 to 20 cm. long, slender, with a thick base, more or less angular, subcanaliculate and hairy on the upper side, elsewhere glabrescent; leaflets 32 to 42, inserted in pairs side by side on the upper side of the rachis, short-petiolulate; petiolules terete, 1 to 1.5 mm. long, canescent; leaflet blades oblong, rounded at both ends, mucronulate at the apex, 2 to 3 cm. long, 7 to 9 mm. broad, glabrous, dark green and subreticulate above, paler and appressed-pubescent beneath. Stipules not seen.

Floral racemes simple, about 35 cm. long or over, the rachis thick, angular, glabrescent or sparsely puberulous, the peduncular part terete, about 6 cm. long. Bracts and bractlets absent. Pedicels slender, glabrous, about 6.5 mm. long. Calyx tube turbinate, oblique, narrow, costulate, dark brown hairy, the 5 lobes reflexed, ovate-oblong, subacute, 10 mm. long, 4 mm. broad, sparsely brown-hairy without. Petals 5, obovate-oblong or spatulate, attenuate into a narrow claw at the base, rounded-obtuse at the apex, more or less oblique, 1.8 cm. long, 7 to 9 mm. broad, entirely glabrous. Stamens 10, the filaments, about the length of the petals, more or less tomentellous-pubescent at the base. Pistil about 2 cm. long, the ovary sessile, oblong, compressed, arcuate, densely brown-hairy, 7-ovulate, attenuate into a long, glabrous style.

Pod (immature) obovate, slightly oblique, long-attenuate and bearing the persistent calyx tube at the base, rounded-obtuse at the apex, about 11.5 cm. long, 3 cm. broad, entirely glabrous, the pedicel 1.2 cm. long.

Type in the U. S. National Herbarium, no. 578657, collected at San Felipe, Department of Retalhuleu, Pacific coast of Guatemala, flowers and young fruits, February 4, 1906, by W. A. Kellerman (no. 5566).

This new type, through which the area of distribution of the genus is extended far beyond its previously known limits, is closer systematically to

¹ In Mart. Fl. Bras. 15²: 75. 1870.

Schizolobium excelsum Vog. than to *S. covilleum* Pittier, differing from the former probably in the number of the pinnæ and leaflets, in the shape and pubescence of the latter and the pubescence of the rachis of the pinnæ, in the shorter pedicels, and in the longer calyx lobes, smaller petals, etc. An immature specimen collected in the semiarid district of the Atlantic coast of Guatemala (Chiquimula and Alta Verapaz) by Sereno Watson (no. 248) probably belongs to the same species.

Named in honor of the collector, the lamented Prof. W. A. Kellerman, who lost his life in the course of his botanical survey of Guatemala.

A LITTLE KNOWN SPECIES OF MACROLOBIUM.

Macrolobium floridum Karst. Fl. Columb. 1: 151. pl. 75. 1861.

A middle-sized tree, 20 to 25 meters high, with smooth grayish bark, irregular branching, and elongate crown.

Leaves alternate, paripinnate, always 2-foliolate, glabrous. Stipules acicular, 8 to 12 mm. long, glabrous and caducous; stipels smaller. Petiole 6 mm. long, very thick. Leaflets sessile, obovate-lanceolate, oblique, with the narrow side within, the broad exterior side rounded at the base, acute at the apex, 25 to 35 cm. long, 9 to 11 cm. broad, light green above, paler beneath; nervation prominent beneath, with alternate veins anastomosed along the margin.

Inflorescence racemose, 12 to 16-flowered, borne either on the trunks and limbs or at the ends of the branchlets. Peduncles 3 to 4 cm. long, thick, covered with a few small triangular acute bracts. Flowers pedicellate, about 6 cm. long, with a small bract at the base. Pedicels 8 to 10 mm. long, bearing at the tip 2 obovate bractlets, these about 12 mm. long, more or less connate at the base, rounded at the tip, entirely glabrous. Calyx tube short-stipitate, 1 cm. long, callous and hairy inside at the throat; sepals 4, imbricate, ovate-elliptic, slightly attenuate at the base, rounded at the tip, about 2 cm. long and 6 mm. broad, entirely glabrous. Petal single, unguiculate, elliptic-lanceolate, twice as long as the sepals (7 mm. long, claw included), about 12 mm. broad, crispate and irregular on the margin, very caducous, pinkish white (turning to yellowish brown by desiccation). Stamens 3, equal to or a little longer than the petal; filaments thick at the base, subulate at the tip; anthers ovate, versatile, minutely papillose on the upper face. Pistil 4.7 to 5 cm. long; ovary stipitate, minutely pubescent on the sutural margins; ovules 5; style sparsely pubescent at the base, very long, arcuate, terete; stigma rounded-capitellate, papillose.

Legume 12 to 16 cm. long, 4.5 to 5 cm. broad, ligneous, short-stipitate, obtusely apiculate, dehiscent; upper suture broad and slightly canaliculate; valves twisted after dehiscence as in *Brownea*. Seeds 4 or 5, ovate, flat, about 3.5 cm. long and 2.5 cm. broad.

Type from mountains near Puerto Cabello, Venezuela.

Again collected on the plain of Sperdí, near Puerto Obaldía, San Blas Coast, Panama, near sea level, flowers and fruit, September 3, 1911, by H. Pittier (no. 4355).

Our specimens differ from the original description in their smaller inflorescences and somewhat longer pedicels, and in the form of the bractlets, the more or less complete absence of hairs, and a few minor details, but the agreement is so perfect in all other particulars that there is little room for doubt as to the identity of our specimens with the Venezuelan species described by Karsten.

FABACEAE.

NEW OR IMPERFECTLY KNOWN SPECIES OF SEVERAL GENERA.

Sweetia panamensis Benth. Journ. Linn. Soc. Bot. 8: 263. 1865.

A middle-sized tree with rounded crown.

Leaves alternate, imparipinnate; rachis, petiolules, and main nerve of the leaflets minutely hairy, the rachis slender, canaliculate, 6 to 12 cm. long; leaflets 7 to 13, opposite or subopposite, petiolulate, very caducous; petiolules 3 mm. long, terete; leaflet blades ovate-lanceolate, broadly cuneate at the base, rounded and emarginate at the broad tip, 2.5 to 5 cm. long, 1.7 to 2.5 cm. broad, inequilateral, coriaceous, dark green and lustrous above, pale beneath. Stipules very caducous or absent.

Inflorescence consisting of branched panicles in the axils of the terminal leaves. Rachises minutely pilose, the primary one 8 to 14 cm. long, the secondary ones successively shorter, 5 to 2 cm. long. Flowers numerous, pedicellate; pedicels 3 mm. long, pubescent, provided with 2 opposite, acicular, hairy, persistent bractlets about 11 mm. long; calyx persistent, about 3 mm. long, pubescent without, divided to the middle into 5 acute lobes; petals 5, spatulate, long-unguiculate, the blade suborbicular, slightly emarginate at the tip, the anterior one smaller (3.5 to 4 mm. long) with reduced blade, the 4 remaining more or less equal, about 6.4 mm. long and 3 mm. broad. Stamens 10, almost equal, quite glabrous, about 6 mm. long; anthers ovoid, dorsifixed, longitudinally dehiscent. Pistil glabrous, stipitate, oblique, about 8 mm. long; ovary 3-ovulate; style attenuate to an undivided acumen, persistent.

Legumes 1 or 2 to each spikelet, 5 to 7.5 cm. long by 1.5 cm. broad, 1 or 2-seeded, elliptic-lanceolate, quite flat, narrowing toward the base into a slender stipe, pedicellate, the pedicel as in the flower. Seeds small, ovoid, slightly depressed, reddish brown, with a black line on the edge below the hilum, about 6 mm. long by 5 mm. broad and 3 mm. thick; hilum small, ovate.

Type in the Kew Herbarium.

COLLECTIONS:

PANAMA: Near Paraíso, Canal Zone, in woods, *Sutton Hayes* 267, type. Experiment Station at Matías Hernández, near Old Panama, flowers, September 20, 1914, fruits, October, 1914, *Pittier* 6793. Also reported from southern Darién.

Notwithstanding the vagueness of Benthams description, the identity of his *S. panamensis* with our specimens is quite evident. The tree is known in Panama under the name of "malvecino."

Platypodium maxonianum Pittler, sp. nov.

A tree 20 to 25 meters high. Trunk usually straight, 12 to 15 meters high, and up to 1.2 meters in diameter at the base; bark grayish, more or less rimose and shaggy.

Leaves alternate, with 10 to 20 leaflets. Rachis 10 to 20 cm. long, slender, thickened at the base, broadly canaliculate above, more or less pubescent, the petiolar portion 1.5 to 2 cm. long. Leaflets subcoriaceous, very oblique, the terminal one sometimes replaced by a setulose appendage 7 to 9 mm. long; petiolules 1 to 2 mm. long, terete, blackish, sparsely pubescent; leaflet blades elliptic-oblong, subcuneate at the base, rounded, emarginate, and mucronulate at the apex, light green, lustrous and more or less pubescent along the midvein above, paler and pubescent near the base and along the midvein beneath, 3 to 6 cm. long, 1.5 to 2 cm. broad, the smaller leaflets at the base of the leaf; veins

slender and prominent on both sides of the blade, finely reticulate beneath; margin entire. Stipules and stipels very caducous and not seen.

Flowers unknown.

Legume glabrous, samara-like, oblanceolate, stipitate, 11 to 11.5 cm. long, about 2.5 cm. broad, the basal part flat and membranous, the apex, bearing the seed, thicker, woody, rounded and apiculate; peduncle 2 cm. long; stipe 12 mm. Seed obovate, elongate, about 18 mm. long and 8 mm. broad, the hilum near the narrower end.

Type in the U. S. National Herbarium, no. 715433, collected in forests around San Felix, eastern Chiriquí, Panama, at about 100 meters above sea level, fruits, December 19, 1911, by H. Pittier (no. 5229).

This is very likely the species previously collected by Hayes between Gorgona and Matachín and reported in the *Biologia Centrali-Americana*¹ under the name of *P. elegans* Vog. The Panama species differs from the latter, however, in its larger leaves and leaflets and in its legume, which is about twice as long, with the venation distinct and the pointed apex more prominent. The pubescence is also less, and the study of the flower will probably bring to light other differential characters.

Named in honor of Mr. William R. Maxon, Associate Curator of the United States National Herbarium.

***Andira chiricana* Pittier, sp. nov.**

A medium-sized tree, with an oblong crown.

Leaves 9 to 11-foliolate, coriaceous; rachis slender, sparsely grayish-hairy, 18 to 22 cm. long; leaflets petiolulate. Petiolules minutely brownish-pubescent, 5 mm. long; leaflet blades elliptic, rounded or subcuneate at the base, acuminate at the tip, glabrous above, minutely tomentose and paler beneath, 3 to 8 cm. long, 1.5 to 3.5 cm. broad, the largest leaflets terminal. Stipules subulate, hairy, caducous, 6 to 7 mm. long; stipels stiff, glabrous, not over 2 mm. long.

Panicles terminal, erect, densely flowered, twice branched, the rachis minutely brownish or grayish-pubescent; bracts like the stipules; bractlets linear, 1 to 2 mm. long, very hairy, fugacious. Flowers 14 to 15 mm. long, including the short (1 mm.) hairy pedicel. Calyx campanulate, acute at the base, densely brownish-pubescent, about 5 mm. long, the anterior tooth rounded, the 4 posterior ones acute. Petal glabrous, pinkish purple; standard obovate, attenuate at the base, emarginate, subauriculate on one side (the left side, looking at the flower from the back), short-unguiculate, the total length 12 mm., the breadth 11 mm., the claw about 2 mm. long; wings 2-auriculate or subcordate at the base, almost straight, rounded at the tip, the claw 3.5 mm. long, the blade 8.8 mm. long and 4 mm. broad; carina 11.5 mm. long, 4 mm. broad, falcate and obtuse at the tip, the petals auriculate, the claw 4 mm. long. Stamens diadelphous. Ovary stipitate, grayish-hairy throughout, 2-ovulate, the style with a few long stray hairs.

Legume not known.

Type in the U. S. National Herbarium, no. 677755, collected near David, Chiriquí, Panama, flowers, March 28, 1911, by H. Pittier (no. 3372).

Andira chiricana is the only known Central American species of the genus having the ovary villous all over. The other species of its group are Brazilian. It seems closely related to *A. fraxinifolia* Benth., but differs in having the ovary 2-ovulate and hairy from the base, the stipules and bracts subulate, and the leaves coriaceous.

¹ Bot. 1: 316. 1880.

Coumarouna panamensis Pittier, sp. nov.

Section *Eucoumarouna*. A portly tree, often reaching 50 meters in height and 1 meter in diameter at the base. Crown rounded. Bark brownish, slightly scaly. Twigs densely lenticellate.

Leaves alternate, glabrous, 5 to 8-foliolate. Petiole 40 to 70 cm. long, flattened above, 6 to 10 mm. broad at the base, closely reflexed-winged on both sides through its whole length, with a median ridge on the upper face from the first leaflets to the end; lower, rounded side densely lenticellate. First pair of leaflets opposite, the others alternate and more spaced along the middle part of the main rachis. Leaflets petiolulate, strongly inequilateral or dimidiate, discolored, densely covered with transparent dots; petiolules 10 to 15 mm. long, sharp-edged on the lower side; leaflet blades elliptic, oblique, 15 to 30 cm. long, 5 to 7 cm. broad (the narrow side equal to about one-third of the whole breadth), subacute at the base, subobtuse at the tip; nervation salient beneath with the costa acutely carinate. Stipules very caducous; stipels lanceolate, 4 to 7 mm. long.

Panicles terminal, loosely branching, 30 to 40 cm. long. Rachis more or less pubescent. Flowers large, pink, pedicellate. Pedicels 4 to 5 mm. long, minutely pubescent. Bracts and bractlets very small, hairy, deciduous. Calyx tubular, attenuate at the base, pubescent, the tube about 6 mm. long, the two anterior lobules 16 to 17 mm. long, 7 mm. broad, glandular-dotted, the three posterior acute and small (the middle one larger, about 1 mm. long). Vexillum suborbicular or ovate, hardly as long as the anterior calyx lobes, bilobate at tip. Wings obovate-oblique, about 16 mm. long, 6.5 mm. broad; the inferior lobe shorter and overlapping the superior one; claw slender, 1.5 mm. long. Petals of the keel free, about 19 mm. long and 6.5 mm. broad, minutely ciliate on the carinal margin, auriculate at the base. Stamens almost equal, all connate nearly to the tip; anthers ovate, short-apiculate. Ovary glabrous, uniovulate.

Fruit flat, elliptic, 6 cm. long, 3.5 cm. broad, and 3 cm. thick or less, pedicellate, rounded and obscurely apiculate at tip, hairy outside in the fresh condition, chocolate-brown and glabrous when dry, the transverse section of the interior cavity subcircular. Pedicel about 1.5 cm. long, thick. Seed almond-like, straight, elongate-oblong, and compressed, 5 cm. long, 1.3 cm. broad, with a light brown episperm.

Type in the U. S. National Herbarium, no. 679031, collected at Bailamonos, between Mamei and San Pablo, Canal Zone, Panama, on a hillside, flowers, July 12, 1911, by E. D. Christopherson (Pittier, no. 3950).

OTHER COLLECTIONS:

PANAMA: Along the Trinidad River, Canal Zone, near sea level, flowers, July 19, 1911, *Pittier* 4033. Forests of Pauarandó, Sambú Valley, southern Darién, fruits, February 8, 1912, *Pittier* 5727.

Coumarouna panamensis is nearly related to *C. oleifera* (Benth.) Taub., of the Mosquito Coast, a species imperfectly described. It has the same large, glandular calycinal wings, but differs in the shape of the vexillum and wings, in the longer and more rounded fruits, and in the size and shape of the seeds. The leaves of the latter species have not been described.

The fresh fruits of *C. panamensis* are covered with a grayish green pubescence and impregnated with an oily, sweet-smelling fluid, which may have its origin in the resinous channels that crowd the mesocarp. When the fruits are dry, these ducts are seen filled with a crystalline substance.

VOCHYSIACEAE.

A SPECIES OF VOCHYSIA REDESCRIBED.

Vochysia ferruginea Mart. Nov. Gen. & Sp. 1:151. pl. 92. 1824.

A tree, varying in height from 10 to 35 meters, and the trunk in diameter from 30 to 80 cm. Trunk straight, 7 to 15 meters from base to first branching, covered with a grayish, rather smooth bark. Branches ascending, forming a spreading crown. Branchlets angular-furrowed, covered with a brown, downy indument.

Leaves opposite, more or less coriaceous, yellowish green, smooth and almost shining above, the petioles and venation of the under face covered with a more or less dense, brown or golden brown pubescence. Petioles 5 to 8 mm. long, canaliculate. Lamina 7 to 12 cm. long, 3 to 5 cm. broad, ovate, ovate-elliptic, or elliptic-lanceolate, acute or subacute at the base, more or less abruptly narrowed at the tip into a long (1 cm.) mucronate acumen; costa thick, very prominent beneath, marked above by a deep furrow; primary veins 14 to 18, parallel, arcuately anastomosed near the margin, prominent beneath and slightly furrowed above; margin entire, revolute. Stipules 1 to 2 mm. long, hairy, subtriangular or subulate.

Inflorescence terminal, erect, simple or branching, the floral branchlets in the latter case axillary and foliate at the base. Rachis, peduncles, and pedicels more or less brownish-tomentose. Individual spikes usually densely flowered, 10 to 15 cm. long. Clusters 1 to 5-flowered, borne on a peduncle 2 to 4.5 mm. long. Pedicels very slender, 4 to 5 mm. long. Bracts very small (1.5 to 2 mm. long), lanceolate-subulate, hairy, caducous. Calyx reddish orange, the interior sepal cucullate, 7.5 mm. long, sparsely pubescent at the base, 3 mm. broad, with a strongly arcuate spur 8 to 9 mm. long, the 4 posterior sepals orbicular and subacute, sparsely ciliate, about 1.5 mm. long and broad, but the two middle ones a little larger. Petals light yellow, oblong-spatulate, more or less tomentose outside at the tip and along the middle part, the middle one about 9.5 mm. long and 3.5 mm. broad, cucullate, the lateral ones spreading, rounded at the tip, 9 to 9.5 mm. long, 2.5 mm. broad. Staminodes small, ligulate, about 1 mm. long. Stamen about 7 mm. long; filament slender, sparsely hairy, about 1.5 mm. long; anther basifixed, naviculiform. Pistil glabrous, 6.5 mm. long; ovary trigonous.

Capsules 2.5 cm. long, dark brown and verruculose outside, hanging from single peduncles 1 to 1.5 cm. long. Total length of achene 24 mm. and of seed 11 mm., the latter pale brown, covered with downy, darker hair.

Type from Brazil.

OTHER COLLECTIONS:

PANAMA: In forests between Panama and Cruces and in the Island of Coyba, *Seemann*. Near Panama, in forests, flowers, April, *Hayes*. Black Swamp near Lion Hill, Canal Zone, flowers, June 5, 1911, *Christopherson* (Pittier, no. 3790). Between Panama and El Corozal, Canal Zone, flowers, September, 1911, *Pittier* 4442. Near San Felix, eastern Chiriquí, on the outskirts of savannas, fruit, December, 1911, *Pittier* 5743.

Seemann identified this species with *V. tomentosa* DC., from which it seems to differ in several well-marked details, such as the smaller stipules, larger leaves, more developed inflorescences, etc. The above description agrees more closely with that of *V. ferruginea* Mart., as given by Warming, who likened to this Brazilian species the specimens collected at Panama by Hayes. The main difference is that the flowers of the Panaman form, as collected by Mr. Chris-

topherson and myself, are sensibly larger; on the other hand, no. 3790, collected in the swamps of the Gatún Basin, now under water, is distinguished in several ways from nos. 4442 and 5743, coming from the dry Pacific slope, and we must assume that there is in this species a rather ample varietal range.

The flowers of *Vochysia ferruginea*, which are very showy, possess a strong scent, which is very like that of the violet.

OCHNACEAE.

A SPECIES OF CESPEDESIA REDESCRIBED.

Cespedesia macrophylla Seem. Bot. Voy. Herald 97. 1853.

A tree, about 20 meters high and up to 60 cm. in diameter at the base, low-branching, the limbs long, ascending, the crown umbraculiform.

Leaves clustered at the ends of the thick branchlets, alternate, glabrous, coriaceous, intermixed with numerous stipules; petioles angular, thick, dilated at the base, flattened above and marginate, 2 to 3.5 cm. long; leaf blades obovate-spatulate, narrowing to the base, truncate-obtuse at the apex, 25 to 70 cm. long, 10 to 24 cm. broad, the costa and veins prominent on both sides, the latter numerous and parallel, the margin mucronate-dentate; stipules linear, 4 to 6 cm. long, 6 to 8 mm. broad, obtuse or subacute, glabrous.

Inflorescences terminal, paniculate, erect, 5 to 140 cm. long, glabrous, the branchlets ascending-divaricate; flowers generally 2 together on a common peduncle, this short and thick; pedicels slender, 1 to 1.5 cm. long; sepals 5, ovate, obtuse, about 3 mm. long, brown, coriaceous, persistent; petals 5, obovate, obtuse, 18 mm. long, 10 to 11 mm. broad, bright yellow, caducous; stamens numerous, the filaments shorter than the petals, inflexed, thickened toward the apex, apiculate; anthers basifixed, linear, opening by terminal pores; ovary stipitate, 5-celled, the ovules numerous; style very short, obscurely 5-lobed at the apex.

Capsule not known.

Type in the Kew Herbarium, collected at Utria Bay, Darién, Colombia, by Seemann.

Again collected on hills back of Puerto Obaldía, San Blas Coast, Panama, flowers, September 3, 1911, by H. Pittier (no. 4340).

A gregarious tree, growing on the hillsides and presenting a gorgeous aspect at the time of blossoming. The leaves and inflorescences, all massed at the ends of the stout branchlets, are enormous, and under this heavy crown the bare skeleton of the tree has an awkward appearance.

COMBRETACEAE.

TWO NEW SPECIES OF TERMINALIA.

Terminalia chiriquensis Pittier, sp. nov.

A tree 25 to 30 meters high, the trunk straight, the bark brownish, smooth, slightly scaly, the crown elongate, the young branchlets fistulose, green, minutely pubescent. Leaves alternate, membranous, eglandular, the petioles canaliculate, more or less rusty-pubescent above, 0.6 to 1 cm. long, the blades ovate-elliptic, long cuneate attenuate at the base, acuminate at the apex, 8 to 14 cm. long, 3 to 5.5 cm. broad, sparsely punctulate and pubescent or glabrous above, reticulate and more or less barbellate along the costa beneath. Floral spikes alternate along the young shoots, 5 to 12 cm. long, subpendulous, many-flowered, the rachis slender, minutely pubescent; flowers greenish yellow, sessile; calyx sessile on the ovary, 0.8 to 1 mm. long, cupuliform, 5-lobulate, minutely pubescent without, villous-tomentose within, the limb 0.8 to 1 mm. long, the lobes reflexed, subobtuse, about 0.7 mm. long; stamens 10, glabrous, the filaments

reflexed at the apex, about 3.5 mm. long, the anthers cordate; disc annular, pulvinate, densely hairy; ovary ovoid-oblong, about 2.5 mm. long, substipitate, smooth, minutely ferruginous-pubescent; style thick, shorter than the stamens, hairy except at the apex.

Type in the U. S. National Herbarium, no. 715696, collected near Remedios, eastern Chiriquí, Panama, among remnants of forest, flowers, December 30, 1911, by H. Pittier (no. 5467).

This species is supposed to belong to the section Dipterae and does not seem ever to have been described. It may correspond to the Guatemalan tree called *Terminalia excelsa* by Liebmann, but not further characterized. This latter name, however, could not stand for this species, since it has been used subsequently by Glaziov to designate a Brazilian tree.

***Terminalia hayesii* Pittier, sp. nov.**

A tree (?), the ultimate branchlets ferruginous-pubescent. Leaves membranous, clustered at the ends of the branchlets, eglandular, the petioles shallow-canaliculate above, ferruginous-pubescent, thicker at the base, 5 to 7 mm. long, the blades obovate-oblong, long-cuneate at the base, abruptly short-acuminate at the apex, 6.5 to 11 cm. long, 2.3 to 3.7 cm. broad, dark green and sparsely pubescent above, paler, reticulate, and ferruginous-pubescent on the costa beneath, ciliate on the margin at the base. Floral spikes densely flowered, growing from the base of the new shoots, the rachis 6 to 12 cm. long, villous-tomentose; flowers sessile; calyx sessile on the ovary, cupuliform, 5-lobulate, grayish-villous without and within, the limb about 1.5 mm. high, the lobes triangular, subacute, reflexed, 0.7 to 0.8 mm. long; stamens 10, glabrous, about 3 mm. long, the anthers ovate; disc inconspicuous, densely villous-tomentose; ovary ovoid, sessile, 1 mm. long, densely long villous tomentose; style shorter than the stamens, villous except at the apex.

Type in the U. S. National Herbarium, no. 202835, collected in Panama by Sutton Hayes in 1859-60.

The American species of the genus *Terminalia* have been so imperfectly described that it is often difficult to distinguish them. The one just described may be either the *T. obovata* or *T. buceras* indicated in Biologia Centrali-Americana as collected by Hayes, but in neither case would the specimens justify the identification. These latter are characterized mainly by the short, densely villous ovary and by the relatively broad limb of the equally villous, cupuliform calyx, with reflexed lobes.

THE MEXICAN AND CENTRAL AMERICAN SPECIES OF COMBRETUM, SECTION MICROPETALAE.

The section Micropetalae Engl. & Diels, of the genus Combretum, includes about 17 South and Middle American species, characterized within the genus by their large flowers, brilliantly colored in several hues of red and yellow. The best known South American species is probably *C. loeflingii* Eichl., extending from southern Brazil to Colombia. The Central American collections have been referred generally to *C. farinosum* H. B. K., but an examination of the specimens under that name in the United States National Herbarium shows this species to be exclusively Mexican, the Central American forms representing 3 old species, another described by Capt. John Donnell Smith as a variety of *C. farinosum*, and 4 new types.

Among these 9 species distributed between Darién (Panama) and central Mexico, one, *C. sambuense*, is distinguished by large, orange red flowers, a sparsely branched inflorescence, and very broad leaves. At first sight, it may be easily confused with *C. coccineum* (Aubl.) Engl. & Diels, which grows in the same region.

In *Combretum superbum* we have another feature which affords ground for immediately sorting it out of the general collection: the panicles present several opposite branchlets, which in their turn bear from 2 to 5 pairs of opposite spikes. This I call a twice-branched panicle; in all the other species considered here the floral spikes issue directly from the main axis. This arrangement of the inflorescence, as noted in *C. superbum*, occurs in other American species belonging to distinct sections, as for instance in *C. leprosum*; in *C. mellifluum* the branching is carried even further. But it is a good distinctive character in so far as the Central American species are concerned.

The 7 remaining species are founded primarily on the variations in the shape and the indument of the petals, and secondarily on characters derived from the calyx and leaves. The fruits also seem to vary in size and indument according to the species, but they are seldom present in the specimens at hand.

As to shape there are 3 types of petals. In *C. farinosum* they are distinctly oblong-spatulate, very narrow in proportion to their length, and with a long claw; whereas they are sessile in all other species, being ovate and decidedly shorter than the calyx lobes in some cases, almost orbicular and mostly equaling the calyx lobes in other instances.

Combretum phaenopetalum, *C. polystachyum*, and *C. argenteum* are the species with ovate petals, the first differing from the two latter in the less degree of hairiness of the calyx inside and of the disc margin, and in the extreme length of the style. A very long panicle with 6 to 8 pairs of opposite spikes, glabrous petals, and a calyx sparsely villous within, distinguish *C. polystachyum* from *C. argenteum*, which has pilosulous petals, a character not found in other species of the section.

The group with orbicular petals includes *C. erianthum* Benth., originally described from specimens collected by Hartweg at Retalhuleu, Guatemala, and probably confused by Eichler¹ with a Brazilian species growing near Rio de Janeiro. It is characterized by having the calyx densely villous-tomentose without, and is possibly the species referred to by Eichler as *C. warscewiczianum*.² The two remaining species, *C. benthamianum* and *C. lepidopetalum*, differ from *C. erianthum* in having their calyx densely covered with whitish or brownish scales. In *C. benthamianum* the petals are glabrous, while they are sparsely scaly in *C. lepidopetalum*.

¹ In Mart. Fl. Bras. 14²: 108. 1867.

² Op. cit. 110.

The 9 types are sufficiently well characterized, to my mind, to be considered as so many distinct species. For those, however, who may object to an extreme division, they may be reduced to six, as follows:

1. *C. sambuense* Pittier.
2. *C. superbum* Pittier.
3. *C. farinosum* H. B. K.
4. *C. argenteum*, with *C. phaenopetalum* and *C. polystachyum* as subspecies.
5. *C. erianthum* Benth.
6. *C. benthamianum*, with *C. lepidopetalum* as a subspecies.

The following character is for the Central American and Mexican species only.

Combretum, section **Micropetalae** Engl. & Diels in Engl. Monogr. Afrik. Pflanzenfam. 3: 10. 1899.

Flowers tetramerous. Calyx funnelform or turbinate-campanulate. Petals small, equal to the lobes or shorter. Stamens 8, much exceeding the calyx, the filaments erect, the anthers ovate or oblong. Disc adnate to the calyx, the margin free and more or less hairy. Ovary ovate or fusiform, more or less stipitate. Fruit a 4-winged samara.

Vines or shrubs, the leaves and inflorescences more or less covered with white or brown scales, the leaves opposite, the inflorescence usually terminal, paniculate, once branched or rarely twice branched, the flowers usually secund in the spikes.

KEY TO THE SPECIES.

- Leaves large for the section, 15 cm. long and up to 9.5 cm. broad; flowers also large, about 2 cm. long, including the ovary----- 1. *C. sambuense*.
- Leaves 4 to 14 cm. long or longer, but always narrower than in the preceding; flowers not over 1.5 cm. long.
- Panicles twice branched----- 2. *C. superbum*.
- Panicles once branched.
- Petals oblong-spatulate, 2 mm. long, 0.8 to 1 cm. broad. Anthers oblong----- 3. *C. farinosum*.
- Petals of broader forms.
- Petals ovate.
- Calyx funnelform, narrow, sparsely villous within; margin of the disc sparsely villous----- 4. *C. phaenopetalum*.
- Calyx turbinate-campanulate, densely scaly without; margin of the disc densely long-villous.
- Panicles up to 45 cm. long, with 6 to 8 pairs of spikes; petals glabrous--- 5. *C. polystachyum*.
- Panicles short, sparsely branched; petals minutely pilosulous without----- 6. *C. argenteum*.
- Petals suborbicular.
- Calyx villous-tomentose without----- 7. *C. erianthum*.
- Calyx scaly without.
- Petals scaly, shorter than the calyx lobes. 8. *C. lepidopetalum*.
- Petals glabrous, equaling the calyx lobes----- 9. *C. benthamianum*.

1. *Combretum sambuense* Pittier, sp. nov.

A vine, the old bark smooth, grayish, the young branchlets 4-marginate (or very narrowly 4-winged). Leaves coriaceous, the petioles thick, flattened and marginate above, scaly, 1 cm. long, the blades broadly ovate, broadly rounded at the base, acute, obtuse, or subacuminate at the apex, 11 to 15 cm. long, 5.5 to 9.5 cm. broad, glabrous, reticulate and lustrous above, paler and minutely scaly beneath. Panicle branches undivided, scaly-pubescent; flowers purplish yellow; calyx narrow at the base, funnel-shaped, coriaceous, minutely scaly-pubescent without, villous above the disc within, about 1.5 cm. long, the lobes rounded, acute, 3.5 to 3.8 mm. long, minutely pubescent within; petals yellow, more or less broadly ovate, acute, 2.5 to 4 mm. long, 2 to 2.5 mm. broad, glabrous; stamens 8, very long, the filaments erect, about 2.5 cm. long, yellow, each with a thick, brushlike tuft of yellowish hairs at the insertion; anthers pinkish; disc margin inconspicuous; ovary strongly 4-angled, stipitate, scaly, about 4 mm. long; style glabrous, apiculate, longer than the stamens.

Type in the U. S. National Herbarium, no. 715807, collected along the Sambú River, southern Darién, Panama, flowers, February 1, 1912, by H. Pittier (no. 5548).

This species is very distinct from any other heretofore reported from Central America and the adjacent parts of South America.

2. *Combretum superbum* Pittier, sp. nov.

A climbing vine, the old bark gray, glabrous, the young branchlets 4-angled, densely brown-scaly. Leaves coriaceous, the petioles canaliculate, scaly, 1.2 to

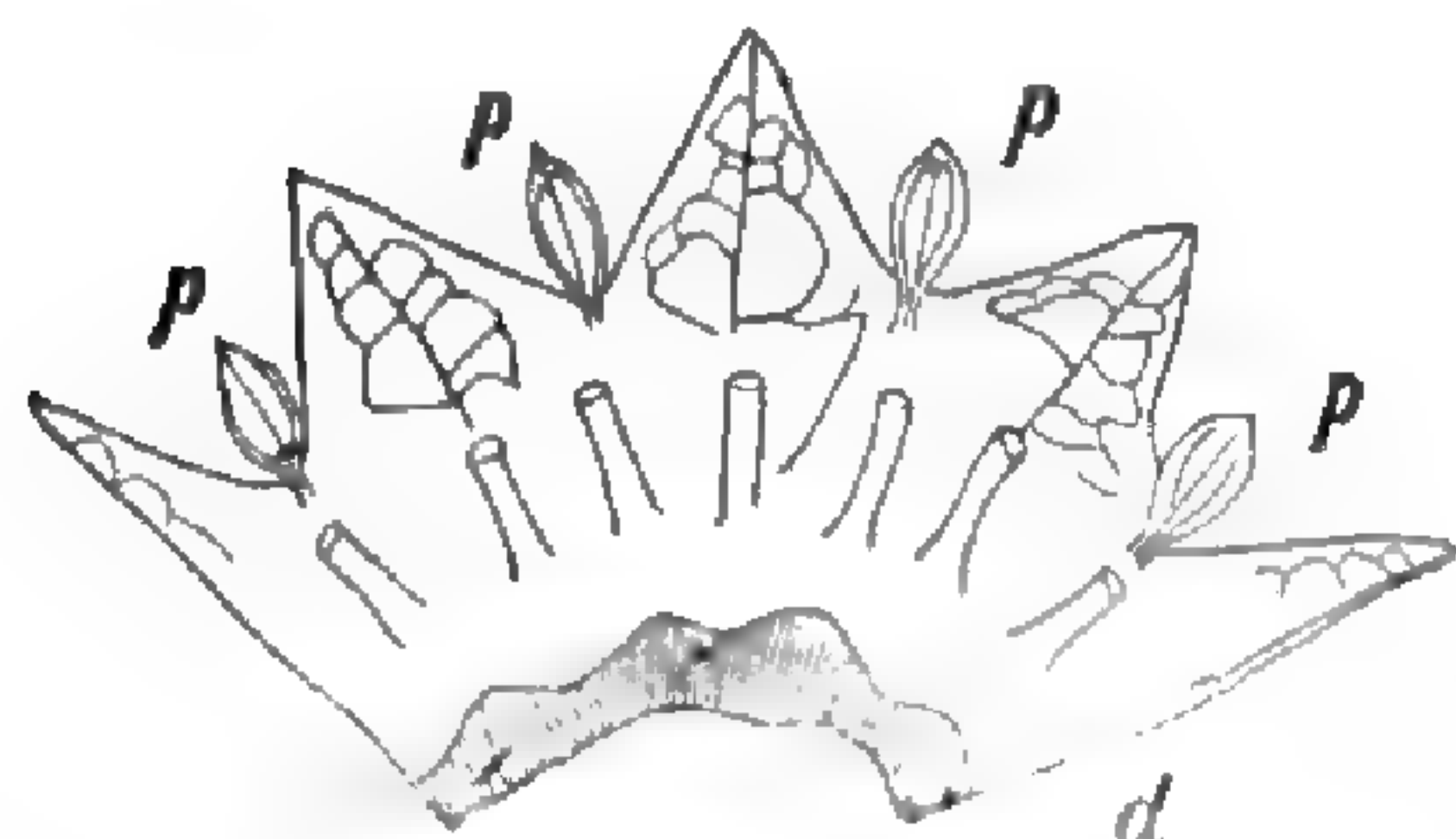


FIG. 98.—Perianth of *Combretum farinosum* spread out, the stamens cut off. *pp*, Petals; *d*, disc. Scale 2.

1.5 cm. long, the blades ovate to ovate-elliptic, acute and subattenuate at the base, acuminate at the apex, 7 to 14 cm. long, 3 to 5.5 cm. broad, glabrous above, densely brownish-scaly beneath. Inflorescences broadly paniculate, twice branched, the main branches densely scaly, strongly quadrangular, the spikes opposite, about 8 cm. long, the rachis brownish-scaly and pubescent; bracts replaced by normal leaves subtending both the main branchlets and the spikes; floral bractlets inconspicuous; calyx funnelform-campanulate, 7 mm. long,

coriaceous, yellow, densely brownish-scaly without, villous-tomentose within, the lobes triangular, acute, about 2.5 mm. long; petals ovate, acuminate, sulphur-yellow, 1.5 to 1.7 mm. long, 1.1 to 1.3 mm. broad, glabrous; stamens 8, the filaments straight, yellow, about 18 mm. long; anthers ovate, purplish; disc margin free, long-villous; ovary brown-scaly without, 4-angled, stipitate, 6 to 8 mm. long; style glabrous, slender, slightly surpassing the stamens.

Type in the U. S. National Herbarium, no. 677068, collected around Culebra, Canal Zone, Panama, flowers, January 1, 1911, by H. Pittier (no. 2158).

This species is distinguished from all the other Central American representatives of the Micropetalae by its long-petiolate leaves and the form of its inflorescence, this composed of several branches, each of which bears 4 or 5 pairs of opposite spikes. The floral characters also are sufficient to characterize *C. superbum* as a distinct species.

3. *Combretum farinosum* H. K. B. Nov. Gen. & Sp. 6: 110. 1823. FIGURE 98.

A climbing vine, the branchlets few, terete, smooth, whitish gray, glabrous, the younger growth grayish-scaly. Leaves subcoriaceous, the petioles semiterete, canaliculate, 0.7 to 2 cm. long, grayish-scaly, the blades ovate-oblong, rounded-attenuate at the base, obtusely acuminate, 6 to 12 cm. long, 4 to 8 cm. broad,

minutely white-dotted above, distinctly white-scaly beneath. Panicles once branched, erect, 9 to 12 cm. long, many-flowered, the rachis angulate, densely scaly. Flowers sparse, orange yellow; calyx articulate upon the ovary, campanulate, stipitate, densely scaly without, villous-tomentose within, principally at the insertion of the stamens, the limb about 10 mm. long, the lobes 3.5 mm. long, triangular, acute; petals spatulate-oblong, acute, glabrous, 2 mm. long, 0.8 to 1 mm. broad; stamens 8, the filaments about 2.5 cm. long, the anthers oblong; disc glabrous within, the free margin 4-sinuate, densely long-villous; ovary fusiform, 4-angled, substipitate, densely scaly, about 4 mm. long; style slender, glabrous, apiculate, slightly surpassing the stamens. Fruit about 16 mm. long and 18 mm. in diameter across the wings, these glabrous, more or less densely scaly. Seed single, linear-fusiform, glabrous.

Type from between Acapulco and Venta del Ejido, Mexico.

OTHER COLLECTIONS:

MEXICO: Mazatlán, flowers, January to March, 1902, *C. A. Purpus* 366.

Vicinity of Acapulco, fruits, May 5, 1895, *Palmer* 397.

4. *Combretum phaenopetalum* (Donn. Smith) Pittier, sp. nov.

Combretum farinosum H. B. K. var. *phaenopetalum* Donn. Smith, Bot. Gaz. 23: 7. 1897.

A climbing vine, the branchlets glabrous, more or less quadrangular toward the ends. Leaves subcoriaceous, the petioles canaliculate, scaly-pubescent, 6 to 8 mm. long, the blades ovate to elliptic, rounded and short-attenuate at the base, acutely acuminate at the apex, 9 to 13 cm. long, 3.5 to 5.5 cm. broad, minutely dotted above, paler, reticulate, and white or brownish-scaly beneath. Panicles sparingly branched, the spikes 2 to 8 cm. long, the rachis scaly and brownish-pubescent; calyx funnelform, narrow, stipitate, about 1 cm. long, brownish-scaly without, sparsely pilosulous within, the lobes triangular, sub-acute, 2.2 mm. long; petals ovate, apiculate, glabrous, 1.6 to 1.8 mm. long, 0.8 to 0.9 mm. broad; stamens 8, glabrous, the filaments about 16 mm. long, the anthers ovate; disc glabrous inside, the sinuate margin sparsely villous; ovary substipitate, scaly, about 3 mm. long; style much longer than the stamens. Samara brownish-scaly.

Type in the U. S. National Herbarium, no. 252374 collected near Nentón, Department of Huehuetenango, Guatemala, flowers and fruits, December, 1895, by E. W. Nelson (no. 3534).

OTHER COLLECTIONS:

GUATEMALA: Cubilquitz, Alta Verapaz, flowers, February, 1900, *von Türckheim* (J. D. Smith, no. 7621). Santa Rosa, Department of Santa Rosa, flowers, November, 1892, *Heyde & Lux* (J. D. Smith, no. 4173).

This shrub is sufficiently well marked to be elevated to specific rank. At all events, it can hardly be considered a variety of *C. farinosum*, from which it departs in its short petioles, larger leaf blades, shorter floral spikes, the rachis of which is covered with a mixture of scales and brownish pubescence, much narrower calyx, with shorter lobes and very sparsely villous within, smaller, ovate petals, disc sparsely villous on the margin, and style exceeding the stamens about 7 mm.

5. *Combretum polystachyum* Pittier, sp. nov.

FIGURE 99.

A climbing vine, the stems subquadrangular, scaly toward the ends. Leaves coriaceous, the petioles semiterete, deeply canaliculate, densely white-scaly, 0.8 to 1 cm. long, the blades ovate to elliptic-oblong, rounded and attenuate at the base, acute or short-acuminate at the apex, 4 to 8 cm. long, 2 to 5 cm. broad, white-scaly and punctulate above, paler and more densely white-scaly beneath. Panicles 30 to 45 cm. long, with 6 to 8 or more pairs of opposite

spikes, these 8 to 10 cm. long, subtended by small leaves, the rachis thick, angular, puberulous, densely flowered; calyx turbinate-campanulate, about 6 mm. long, densely scaly without, the scales intermixed with a minute indument, villous-tomentose inside, the lobes broadly triangular, subacute, 2.2 mm. long; petals ovate, rounded or acuminate at the apex, glabrous, 0.9 to 1 mm. long, 0.6 to 0.7 mm. broad, much shorter than the calyx lobes; stamens 8, the filaments glabrous, 1.8 to 2 cm. long, the anthers ovate; disc glabrous inside, densely villous on the scarcely sinuate margin; ovary substipitate, fusiform, 4-angular, densely scaly, 4 mm. long. Fruit about 2 cm. long, 18 mm. across the wings, pubescent at first, the pedicels scaly, 3 mm. long.

Type in the U. S. National Herbarium, no. 577548, collected on the banks of the Diquís River at Currés, near Boruca, Costa Rica, March 4, 1898, by H. Pittier (Inst. Fís. Geogr. Costa Rica, no. 12140).

OTHER COLLECTIONS:

COSTA RICA: Around Nicoya, in thickets, flowers, February, 1900, *Tonduz* (Inst. Fís. Geogr. Costa Rica, no. 13502).

NICARAGUA: Without locality data, *C. Wright*, U. S. North Pacific Exploring Expedition, 1853-56. Realejo, Department of Chinandega, flowers, January 16, 1903, *Baker* 2088.

This species is easily distinguished on account of its long panicles, with many pairs of spikes, narrow leaves, and diminutive petals. It is closely related to

C. argenteum Bertol., but the petals are glabrous and smaller, the stamens longer, and the indument somewhat at variance.

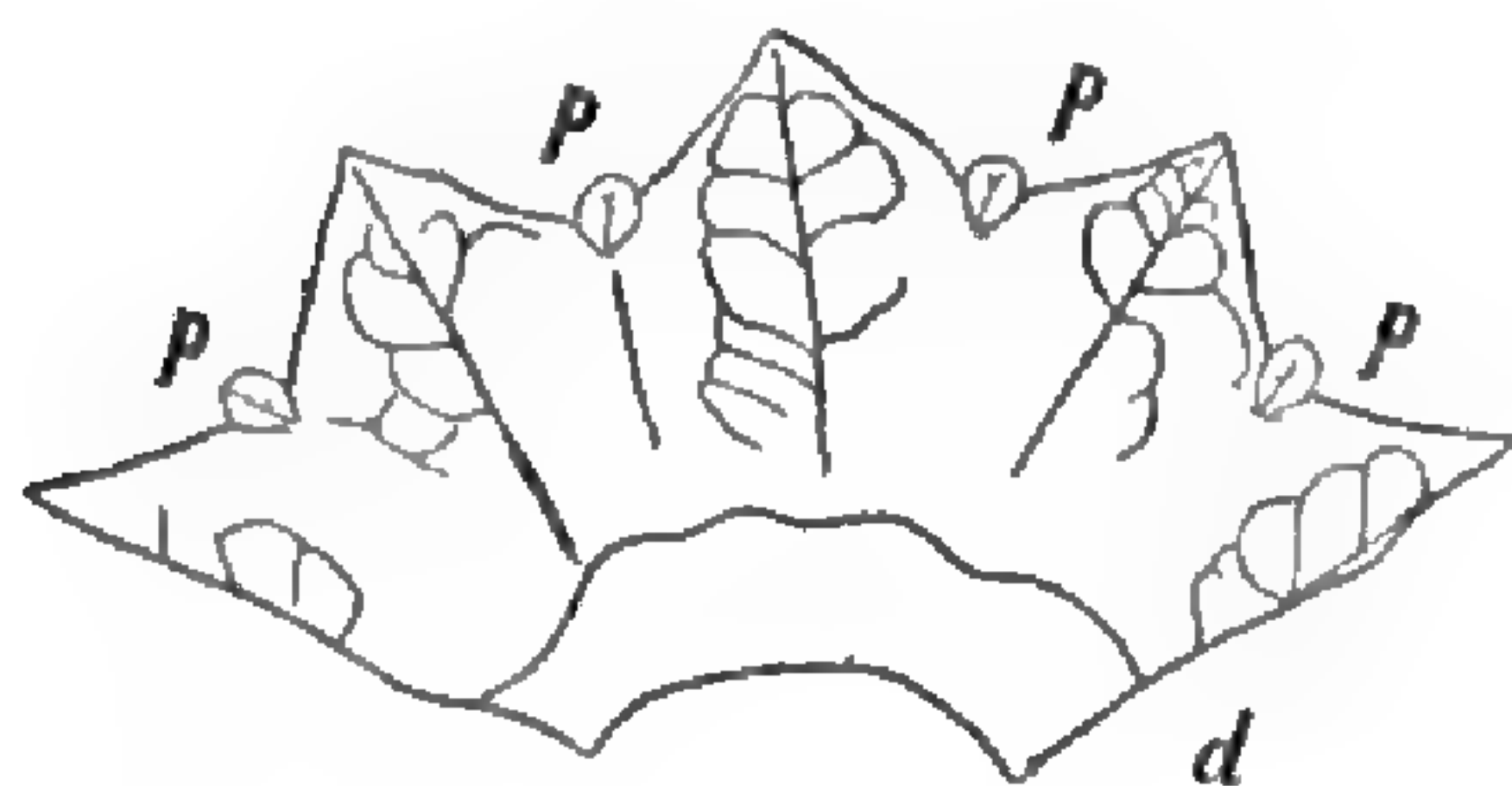


FIG. 99.—Perianth of *Combretum polystachyum* spread out, the stamens removed. *pp*, Petals; *d*, disc. Scale 2.

3. *Combretum argenteum* Bertol. Nov. Comm. Acad. Bonon. 4: 412 1840.

A trailing vine, the old parts gray, glabrous, the new growth sparsely white or brownish-scaly. Leaves coriaceous, the petioles semiterete, canaliculate, 1 to 1.2 cm. long, densely whitish-scaly, the blades ovate-oblong, rounded-attenuate and subdecurrent at the base, acute or obtuse and emarginate at the apex, 5 to 11 cm. long, 2.5 to 5.5 cm. broad, sparsely white-scaly and punctulate above, a little more densely so beneath; stipules foliaceous. Panicles sparsely branched, the rachis angular, densely brownish or whitish-scaly; branches simple; calyx turbinate-campanulate, 7 mm. long from the base of the limb, densely white-scaly without, sparsely white-villous within, the lobes triangular, acute, 1.5 to 2 mm. long, the sinuses broad and rounded; petals ovate, acute, 1 to 1.1 mm. long, 0.7 mm. broad, minutely pilosulous without; stamens 8, the filaments 12 to 15 mm. long, glabrous, the anthers ovate, pink; disc adnate to the calyx, glabrous within, densely white-villous on the sinuate free margin; ovary 4-angled, sessile, densely scaly, about 2 mm. long.

Type from Volcán de Agua, Guatemala.

OTHER COLLECTIONS:

MEXICO: Manzanillo.

GUATEMALA: El Rancho, Department of Jalapa, flowers, January 6, 1906, *Kellerman* 5648. Near Trapiche Grande, Department of Guatemala, flowers, January 23, 1905, *Maxon* 3420.

SALVADOR: Tecoluca, Department of San Vicente, flowers, January, 1893, *Shannon* (J. D. Smith, no. 5038).

This differs from *C. farinosum* principally in the characters of the flower, this being smaller, with ovate, minutely pilosulous petals and ovate anthers. The villosity of the calyx inside is also less and the petioles are longer.

7. *Combretum erianthum* Benth. Pl. Hartw. 73. 1840.

2 *Combretum warscewiczianum* Eichl. in Mart. Fl. Bras. 14²: 110. 1867, hyponym.

A shrub or climbing vine with erect stems and flexuous, glabrous branchlets. Leaves coriaceous, the petioles semiterete, canaliculate, sparsely scaly, 6 to 7 mm. long, the blades oblong-elliptic, more or less rounded and abruptly attenuate at the base, acute at the apex, 10 to 15 cm. long, 3.5 to 5.5 cm. broad, reticulate, dark green and glabrous above, light green and densely brownish-scaly beneath. Panicles sparingly branched, the spikes about 10 cm. long, many-flowered, the rachis angular, tomentose; calyx stipitate, campanulate, 0.8 to 1 cm. long, densely villous-tomentose and sparsely scaly without, glabrescent or sparsely villous within, the lobes triangular, subacute, about 2.5 mm. long; petals orbicular-acuminate, glabrous, 2.5 mm. long, 2 to 2.2 mm. broad, equaling the calyx lobes; stamens 8, glabrous, the filaments about 2.3 cm. long, the anthers ovate; ovary subclavate, substipitate, 4-angular, villous, 4.5 mm. long; style slightly exceeding the stamens.

Type from Retalhuleu, Guatemala.

Again collected at El Cedral de Gualán, on the road to Copán, Guatemala, altitude about 400 meters, flowers, January 5, 1906, *Pittier* 1874.

The writer's collection agrees closely with Bentham's description, except in the petals being equal to the calyx lobes and not shorter. Eichler's name, applied to specimens from Costa Rica and Nicaragua, is probably a synonym.

8. *Combretum lepidopetalum* Pittier, sp. nov.

A climbing vine, the branchlets terete, more or less scaly-pubescent. Leaves submembranous, the petioles semiterete, canaliculate, scaly-pubescent, 6 to 9 mm. long, the blades ovate, rounded and short-attenuate at the base, obtuse, acute, or short-acuminate at the apex, 7 to 10 cm. long, 3.5 to 5 cm. broad, dark green and very sparsely scaly above, paler and very densely whitish-scaly beneath. Panicles 5 to 9-branched, the spikes 7 to 9 cm. long, the rachis pubescent, the indument intermixed with few scales, yellow; calyx funnelform-campanulate, about 1 cm. long, densely fulvous-scaly without, tomentose-pubescent within, the lobes triangular, subacute, about 1.8 cm. long; petals suborbicular, abruptly acuminate, sparsely scaly, 2.3 to 2.5 mm. long, 1.9 to 2.1 mm. broad; stamens 8, the filaments glabrous, about 2.2 cm. long, the anthers ovate, pinkish; disc glabrous and longitudinally plicate within, densely grayish-villous on the free, almost straight margin; ovary ovoid, stipitate, 4-angular, about 4 mm. long, minutely scaly; style exceeding the stamens. Fruit about 18 mm. long, 17 mm. broad across the wings, the pedicels 4 mm. long, puberulous, the wings purplish red, minutely scaly.

Type in the U. S. National Herbarium, no. 715233, collected between Pocrí and Natá, Province of Coclé, Panama, in thickets, flowers, December 7, 1911, by H. Pittier (no. 5006).

Found also around Penonomé, Province of Coclé, fruits, February, 1908, by R. S. Williams (no. 72).

This belongs to the group with suborbicular petals, its nearest affinities being with *C. benthamianum*, from which it differs in having a shorter calyx, densely scaly without and with longer lobes, slightly smaller and scaly petals, and leaves scaly on the upper surface.

9. *Combretum benthamianum* Van Heurck & Muell. Arg. in Van Heurck, Obs. Bot. 220. 1871. FIGURE 100.

A trailing vine, the branchlets terete or subquadrangular, grayish or brownish, glabrous. Leaves coriaceous, the petioles semiterete, canaliculate, sparsely scaly, 0.7 to 1.5 cm. long, the blades ovate or oblong, rounded-attenuate or

cuneate-attenuate at the base, acute or obtuse and emarginate at the apex, 7 to 14 cm. long, 4.5 to 5.5 cm. broad, glabrous and reticulate above, minutely reticulate and densely brownish-scaly beneath. Panicles foliate, the spikes numerous, often 3 or 4-verticillate, 9 to 12 cm. long, the rachis subquadrangular, ferruginous-pubescent, scarcely scaly; calyx funnelform-campanulate, articulate

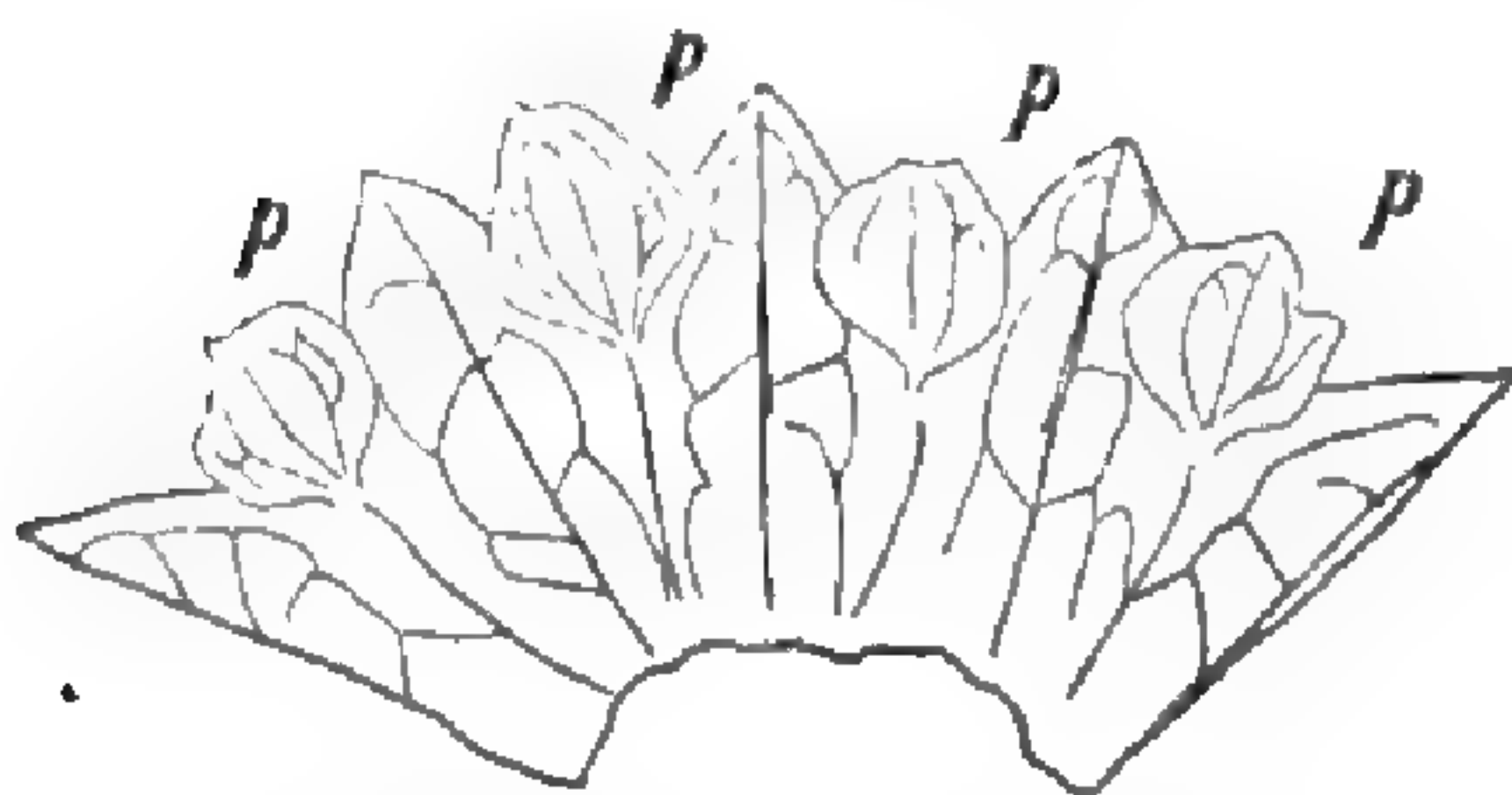


FIG. 100.—Perianth of *Combretum benthamianum* spread out. pp, Petals. Scale 2.

upon the ovary, sparsely brownish-scaly without, slightly fulvous-villous on the limb within, about 12 mm. long, the lobes rounded-triangular, acute, glabrous inside, minutely pilosulous on the margin, about 3 mm. long; petals sub-orbicular or broadly ovate, glabrous, more or less distinctly apiculate, 2.2 to 3 mm. long, 2.2 to 2.5 mm. broad, equaling the calyx lobes; stamens 8, the filaments about 2.2 cm. long, the anthers ovate; disc glabrous within,

densely villous on the free, slightly sinuate margin; ovary fusiform, 4-marginate, scaly-puberulous, stipitate, 4 to 5 mm. long; style exceeding the stamens. Follicles sparsely scaly on the wings, 2 cm. long, 1.8 cm. broad across the wings, the pedicel pilosulous, 3 mm. long; seed oblong, acute at both ends, smooth, about 7 mm. long, 4-winged, 2 of the wings broader.

Type from Guatemala.

Again collected in the vicinity of San Salvador, El Salvador, flowers and fruits, by Dr. C. Renson (nos. 36, 68).

This differs from *C. farinosum* H. B. K. in its smaller flowers and sub-orbicular petals and in its indument. From the closely allied *C. argenteum* Bertol. it departs in having the leaves perfectly glabrous above, the panicles profusely branched, with a pubescent rachis, and the petals much larger and proportionally broader.

FOUR NEW OR IMPERFECTLY KNOWN SPECIES OF COMBRETUM OF OTHER SECTIONS.

Combretum alternifolium Pers. Syn. Pl. 1: 412. 1805.

A vine, the branchlets terete, grayish, sparsely covered with minute white scales, the younger parts sparsely brownish-pubescent. Leaves subcoriaceous, alternate, the petioles terete, subcanaliculate, 0.5 to 1 cm. long, pubescent, the blades broadly ovate, rounded and sometimes oblique at the base, acute or sub-obtuse and mucronate at the apex, 5 to 7.5 cm. long, 3.5 to 5 cm. broad, glabrous, dark green above, paler and reticulate beneath. Inflorescence broadly paniculate, many-flowered, the rachis minutely brownish-pubescent and sparsely scaly, the branchlets opposite, subopposite, or alternate, those near the base subtended by caducous leaves, those toward the apex by caducous, subulate, densely brownish-hairy bracts about 3 mm. long. Flowers opposite or alternate in the spikelets, the bractlets subulate, glabrous, about half the length of the ovary; calyx campanulate, 5-lobed, about 2 mm. long, glabrous without, long-hairy inside at the insertion of the stamens; petals 5, oblong, narrower at the base, obtuse and often emarginate at the apex, 2.3 to 2.5 mm. long, 1 to 1.1 mm. broad, densely villous-tomentose on both sides, white; disc tubular, surrounding the style, crowned with long stiff hairs; ovary fusiform, stipitate, 5-angled, glabrous, about 2.5 mm. long; style subulate, 5.5 mm. long, surpassing the stamens.

Type from Cartagena, Colombia.

OTHER COLLECTIONS:

PANAMA: Iguana Island, *Seemann*. Punta Patiño, southern Darién, along the beach (with *Hippomane*), flowers, April 27, 1914, *Pittier* 6607.

Persoon's characterization of his *C. alternifolium* applies almost equally to my nos. 4002 and 6607. The former, however, is glabrous or almost so and well characterized besides by the glandular dots covering the ovaries and branchlets, a detail which would hardly escape observation. On the other hand, the climatic conditions of the district where the specimens of the latter number were collected resemble more those of Cartagena, the original locality of Persoon's species. Consequently, I refer to this my no. 6607, while no. 4002 is made the type of a new species. I have not seen Seemann's specimens.

• ***Combretum epiphyticum* Pittier, sp. nov.**

A trailing vine, the upper branchlets terete, grayish-puberulous, the younger growth ferruginous-pubescent. Leaves opposite, coriaceous, the petioles 5 mm. long, ferruginous-pubescent, the blades orbicular or ovate, rounded and narrowly emarginate at the base, rounded-obtuse and often emarginate or mucronate at the apex, 5 to 13 cm. long, 4.5 to 7 cm. broad, glabrous except on the ferruginous-pubescent costa above, reticulate and sparsely hairy on the costa, veins, and venules beneath. Inflorescences paniculate at the ends of the branchlets, the rachis ferruginous-pubescent, the branchlets opposite, subtended by a small leaf at the base of the panicle, by a lanceolate, caducous bract 3 to 4 mm. long farther up. Flowers sessile, sweet-scented; bractlets subulate, reddish, hairy, nearly 2 mm. long; calyx broadly campanulate, 4-toothed, about 2 mm. long, sparsely pubescent without and within; petals 4, sessile, broadly ovate or suborbicular, 0.7 to 0.8 mm. long, 1 to 1.2 mm. broad, white, glabrous; stamens 8, glabrous, 4 opposite the calyx teeth and inserted at the margin of the disc, 4 opposite the petals and inserted a little higher on the calyx limb, the filaments 2 to 2.2 mm. long, subulate, the anthers ovate; disc thin, dark brown, adnate to the calyx, glabrous; ovary inferior, ovoid, about 1.5 mm. long, densely fulvous-hairy; style glabrous, subulate, longer than the stamens.

Type in the U. S. National Herbarium, no. 716878, collected at Caño Quebrado, Canal Zone, Panama, growing on dead tree in lake, flowers, October 31, 1914, by H. Pittier (no. 6819).

Collected also at the type locality, June 14, 1914, *Pittier* 6668, and near Gatún, Canal Zone, in swamps, flowers, March 9, 1860, *Hayes* 7.

This species is characterized by the pubescence, the reddish bractlets, the sessile petals, and the long, fulvous indument covering the ovary. It is closely allied to *Combretum jacquini* Griseb., differing mainly in the shape of the petals and in the hairiness of the leaves and ovary.

***Combretum nicoyanum* Pittier, sp. nov.**

A climbing vine, the branchlets terete, glabrous or glabrescent, the young growth grayish-pubescent. Leaves coriaceous, opposite or subopposite, the petioles densely brownish-hairy, 6 to 8 mm. long, the blades ovate or obovate, rounded at the base, more or less abruptly acuminate at the apex, 4.5 to 9.5 cm. long, 3 to 4.5 cm. broad, at first ferruginous on both sides, later glabrous or glabrescent above, reticulate and puberulous beneath, principally on the costa and veins. Inflorescence terminal, paniculate, loose, the rachis densely brownish-pubescent, the branchlets slender, opposite, subopposite, or in whorls of 3, subtended at the base by small leaves, further up by lanceolate, caducous bracts about 4 mm. long; flowers subsessile, each provided with a subulate, caducous bractlet shorter than the ovary; calyx cuplike, 5-toothed, about 2 mm. long, pilosulous without, barbellate within at the insertion of the stamens; petals 5, sessile, obovate, rounded or emarginate at the apex, 2 to 2.3 mm. long, 0.9 to 1.2 mm. broad, white, minutely hairy and ciliate; stamens 10, the 5 opposite the petals inserted higher than those opposite the calyx teeth, the filaments long and twisted, the anthers ovate; disc tubular; ovary linear,

substipitate, 5-angled, pilosulous. Fruit glabrous, fusiform, 5-winged, about 16 mm. long and 17 mm. in diameter, including the wings.

Type in the U. S. National Herbarium, no. 577731, collected near Nicoya, Costa Rica, in thickets, flowers, January, 1900, by A. Tonduz (Inst. Fis. Geogr. Costa Rica, no. 13503). No. 16982 of this series is the same species from the same locality.

Combretum punctulatum Pittier, sp. nov.

A thorny, climbing vine, the branchlets terete, brownish-pubescent. Leaves alternate, membranous, the petioles terete, brownish-pubescent, 3 to 5 mm. long, the blades ovate, rounded at the base, long-acuminate and mucronate at the apex, 5 to 8 cm. long, 2.5 to 3.2 cm. broad, glabrous and dark green above, paler beneath, the costa and veins sparsely pubescent, and the axils of the veins barbellate. Inflorescence broadly paniculate, the rachis pubescent and sparsely dotted with minute dark glands, the larger branches alternate and subtended by normal leaves, the secondary branches subopposite, with small, lanceolate, sparsely hairy, caducous bractlets, these about 4 mm. long. Flowers numerous, alternate or subopposite, the bractlets lance-subulate, shorter than the ovary; calyx campanulate, 5-lobate, about 2.5 mm. long, glabrous without, except at the minutely hairy apex of the lobes, long-hairy inside at the insertion of the stamens; petals 5, sessile, obovate-oblong, 1.8 to 2 mm. long, 0.8 mm. broad, white, more or less hairy and ciliate, especially toward the apex; disc tubular, surrounding the base of the style, 0.2 to 0.3 mm. high, bearing a crown of stiff hairs about 0.5 mm. long; ovary fusiform, substipitate, 5-angled, 1.5 to 1.7 mm. long, sparsely brownish-pubescent and dotted with minute dark glands; style glabrous, subulate, about 5.5 mm. long.

Type in the U. S. National Herbarium, no. 679085, collected along the Trinidad River, Canal Zone, Panama, flowers, July 19, 1911, by H. Pittier (no. 4002).

This differs from *C. alternifolium* in having its leaves pubescent on the costa and veins beneath, and the ovary also pubescent and covered with darkish glandules.

MELASTOMATACEAE.

AN OLD AND A NEW SPECIES OF MICONIA.

Miconia darienensis Pittier, sp. nov.

Section Eumiconia, subsection Paniculares. A tree up to 20 meters high, the trunk 40 cm. in diameter; bark gray or reddish gray, smooth; crown elongate, with ascending limbs; young branchlets very short, obscurely tetragonous, sparsely puberulous.

Leaves membranous, entire, glabrous, the blade trinervate from above the base and with inconspicuous marginal pseudo-nerves. Petioles 0.5 to 1 cm. long, rather thick, slightly canaliculate and puberulous. Leaf blades 8 to 24 cm. long, 2 to 5 cm. broad, elliptic-lanceolate, acute at base and more or less obtusely acuminate at the apex, dark green above, paler beneath. Lateral nerves starting at about 1 cm. from the base of the lamina; transverse veins almost perpendicular to the costa (angle about 84 degrees).

Panicles terminal, about 10 cm. long, ovoid-globose or pyramidal, the secondary branches, except at the basal node, 4 to each node, 2 of these being short and simple and 2 longer and again branched. Rachis of the panicle glabrous or slightly puberulent. Flowers pentamerous, pediceled, about 7 mm. long (including pedicels), clustered at the ends of the ultimate branches of the rachis. Pedicels 1 to 1.5 mm. long, slender, glabrous. Calyx campanulate,

distinctly 5-toothed, glabrous, 1.5 mm. long. Petals obliquely obovate, slightly emarginate at the apex, glabrous, 2.5 mm. long, 1.8 mm. broad, white. Stamens 10, about 5 mm. long, pubescent, the filaments slender, the anthers gibbous and biauriculate at the base, opening by an apical pore. Ovary globose; style 4.5 mm. long, pubescent; stigma capitellate. Berries bluish black.

Type in the U. S. National Herbarium, no. 715709, collected on a thinly forested hill near La Palma, southern Darién, Panama, flowers, January 25, 1912, by H. Pittier (no. 5478).

This species of *Miconia* ranks among the largest representatives of the group and takes its place between *M. poeppigii* Triana and *M. pyrifolia* Naud. From the first it differs mainly by its leaves, these being entirely glabrous but for the petioles, their petioles shorter and blades longer, and by its glabrous calyx and pubescent stamens and style; from the second it is distinguished by its habit, the obscurely tetragonous branchlets, and the shape and size of the details of the flower.

***Miconia fulva* DC. Prodr. 3: 180. 1828.**

Section Chaenantha. A tree, reaching a height of 10 meters, the trunk with a basal diameter of about 30 cm. Trunk straight; crown elongate or pyramidal; bark reddish. Young twigs acutely 4-angled, covered, like the petioles and lower face of the leaves, the rachis of the inflorescences, and the calyx of the flowers, with a dense coating of golden brown, stellate scales.

Leaves membranous, opposite or 3 or 4-verticillate, petiolate, smooth and almost glossy on the upper face, 3-nerved from the base of the blade with 2 marginal pseudo-nerves. Petiole angular or sulcate, deeply canaliculate, 5 to 12 mm. long; leaf blades 7 to 23 cm. long, 1.5 to 5 cm. broad, lanceolate, subacute at the base, acute and long-acuminate at the apex; nerves and transverse veins impressed above, the former salient beneath, the latter forming with the costa an angle of about 68 degrees; margin obscurely sinuate.

Panicles terminal, 10 to 15 cm. long, pyramidal, the primary branches of the rachis angular the secondary ones in whorls of 4, subequal. Flowers pentamerous, sessile, about 4 mm. long, one opening at a time in each small cluster. Calyx campanulate, 2 mm. long, irregularly denticulate on the margin, covered outside with minute stellate scales, darker in the center. Petals 2.2 mm. long, 1.5 mm. broad, ovate, irregularly denticulate-truncate at the tip, white. Stamens 10, 3 to 3.5 mm. long, glabrous; filaments flattened, deflexed; anthers cuneate, truncate at tip, slitting lengthwise.

Ovary semiinferior; style about 4 mm. long, glabrous, slightly clavate.

Type from Cayenne.

OTHER COLLECTIONS:

PANAMA: Around San Felix, eastern Chiriquí, in open forest, flowers, December 17, 1911, *Pittier* 5171; flowers, December 23, 1911, *Pittier* 5265.

SAPOTACEAE.

A NEW SPECIES OF MIMUSOPS.

***Mimusops darienensis* Pittier, sp. nov.**

A large tree, 40 to 50 meters high, the trunk often over 1.5 meters in diameter. Main roots 3 or 4, powerful but almost even with soil surface and never buttressed. Trunk straight; bark grayish brown and scaly. Limbs strong, horizontal, forming a depressed, spreading crown. Young shoots thick, grayish and more or less brownish pubescent.

Leaves alternate, petiolate, thick and coriaceous, crowded at the ends of the shoots. Petioles 2 to 3 cm. long, rather thick, roundish, obscurely canaliculate or flattened above. Leaf blades 8 to 14 cm. long, 4.5 to 6.5 cm. broad, obovate or oblong-elliptic, short-acute at the base, rounded-obtuse at the apex, smooth and almost glossy above, at first golden brown or ferruginous beneath, becoming brownish green. Costa impressed above, very salient beneath; primary veins slender, parallel, numerous (about 38 on each side of costa), scarcely distinct on the upper face of leaf, slightly salient beneath and anastomosed along the margin. Stipules narrowly lanceolate, about 5 mm. long, caducous.

Flowers fasciculate in the axils of the leaves, 3 to 12 in each cluster. Pedicels about 3 cm. long (equal to, or longer than, the petioles), more or less brownish-pubescent and thickening toward the end. Sepals 6, biseriate, about 6 mm. long, 3 to 3.5 mm. broad, ovate, obtuse or more or less attenuate at the tip, coriaceous, the 3 exterior ones downy-pubescent, the interior ones grayish-pubescent outside, all glabrous inside. Corolla caducous, about 6.5 mm. long, white, minutely pubescent outside, glabrous inside, spreading; tube 1.5 mm. long; lobes 18, the 6 interior ones 4 mm. long, narrowly lanceolate with rounded tip and inflexed margin, the 12 exterior ones about 5 mm. long, lanceolate, acute, broad at the base (1.5 to 2 mm.), a few entire, but the most bifid. Staminodes and stamens connate at the base, the former lanceolate, subulate, about 2 mm. long, more or less minutely denticulate on the margin. Stamens 6, about 3 mm. long; filaments subulate; anthers ovate, short-apiculate, extrorse. Pistil entirely glabrous, 6.5 mm. long; ovary 9-celled.

Type in the U. S. National Herbarium, no. 679446, collected on hills back of Puerto Obaldía, San Blas Coast, Panama, flowers, August 31, 1911, by H. Pittier (no. 4318).

OTHER COLLECTIONS:

PANAMA: Forests of the hills around Gatún, Canal Zone, leaves only, February, 1911, *Pittier* 2699. Hills of Sperdí, near Puerto Obaldía, San Blas Coast, young fruits, September 5, 1911, *Pittier* 4384.

Of no. 4318, the type of the species, no fruits were collected; no. 4384 is a specimen with a fruit in its first stage of development and consequently too immature to furnish good characters. With the leaves of no. 2699, two more advanced berries were obtained, but the whiteness of the seeds shows that they were not quite mature. The fruits are ovoid, perfectly smooth, mucronate, about 3 cm. long and 2.5 cm. in diameter; 8 of the 9 cells are empty, and in each fruit the remaining cell contains 1 seed. This is large and flattened, with the hilum near the lower extremity. Although still immature, these seeds seem to have reached their full size, and measure 12.5 mm. in length, 5.5 mm. in breadth on the hilum side, and 6 mm. in thickness from the hilum to the carina.

With the Costa Rican *Mimusops spectabilis* Pittier, this new species belongs to section Ternaria of the subgenus Eumimusops or Manilkaria. Through its subentire, subulate staminodes, it is related to the former, and also to *M. longifolia* A. DC., but differs widely by other floral characters, as for instance the entire lobes and lobules of the corolla, the scarcely denticulate staminodes, and the multiflorous axial clusters of the inflorescence.

Mimusops darienensis has great economic importance as the source of the Panama "balata" or "gutta-percha," and the wood is also very valuable. From an ecological standpoint the tree, which is very abundant in the hilly hinterland of the Caribbean coast, is to be considered as a characteristic element of the rain forests of the eastern part of the Isthmus. Its presence on the southern or Pacific slope has been reported by natives, but as yet lacks confirmation.

BORAGINACEAE.

SEVEN NEW SPECIES OF *CORDIA*.*Cordia eriostigma* Pittier, sp. nov.

FIGURE 101.

Section Myxa, subsection Laxiflorae. A middle-sized tree, the crown rounded-depressed, the young branchlets minutely ferruginous-pubescent.

Leaves coriaceous, the petioles thick, angulate, sulcate, glabrous, 1.5 to 1.7 cm. long, the blades ovate or obovate, entire, broadly cuneate at the base, obtuse at the apex, 8 to 14 cm. long, 5 to 7 cm. broad, impressed-reticulate, glabrous, dark green and lustrous above, paler, glabrous, minutely elevated-reticulate beneath, the costa and veins very sparsely ferruginous-pubescent, impressed on the upper face of the blade, very prominent on the nether face.

Inflorescences terminal, cymose-paniculate, the rachis more or less ferruginous furfuraceous pubescent. Flowers single or geminate on a pedicel 3 to 4 mm. long; calyx membranous, broadly campanulate, about 6 mm. long, 3 or 4-lobulate, the lobes acute, sometimes parted at the tip; corolla white, broad, about 9 mm. long (the tube 6 mm. long), subcampanulate, 5-lobulate, glabrous without, densely hairy inside below the insertion of the stamens, the lobes broad, rounded or subacute at the apex, reflexed; stamens free from about 3 mm. above the base of the corolla, the filaments almost glabrous, the anther cells 2 mm. long, ovoid, acute and divaricate at the base; ovary ovoid, obtuse; style glabrous, dividing first into 2 branches, these in their turn divided, the whole about 1.5 mm. long; stigmas large, depressed-ovoid, the surface densely white-woolly.

Drupe not seen.

Type in the U. S. National Herbarium, no. 531695, collected at El Paso de la Balsa, on the Cauca River, near Jamundí, Cauca, Colombia, at an altitude of 980 meters, in flower, February 10, 1906, by H. Pittier (no. 1489).

At the time of its discovery, this tree was profusely covered with the white, very fragrant blossoms and surrounded by swarms of bees, bumblebees, and other insects. It should certainly take a prominent place among the melliferous trees of the Tropics, but does not seem to be of very frequent occurrence in the Cauca Valley. Its affinities are with *Cordia nitida* DC. and *C. lasiocalyx* Pittier.

Cordia lasiocalyx Pittier, sp. nov.

Section Myxa, subsection Laxiflorae. A small or middle-sized tree, entirely glabrous, the trunk low, the crown rounded and spreading; bark smooth, gray on the trunk and limbs, purplish on the branchlets.

Leaves submembranous, dark green above, paler beneath, lustrous on both faces, the petioles rather slender, sulcate, 8 to 14 mm. long, the blades elliptic or oblong-elliptic, 10 to 12 cm. long, 3.5 to 4 cm. broad, cuneate-attenuate at the base, abruptly long-acuminate to the acute, mucronate apex; costa prominent on both faces, the veins and veinlets prominulous, more so on the lower face.

Inflorescence cymose-paniculate, terminal or in the upper axils of the leaves, more or less regularly dichotomous, about equaling the leaves, the cymes many-

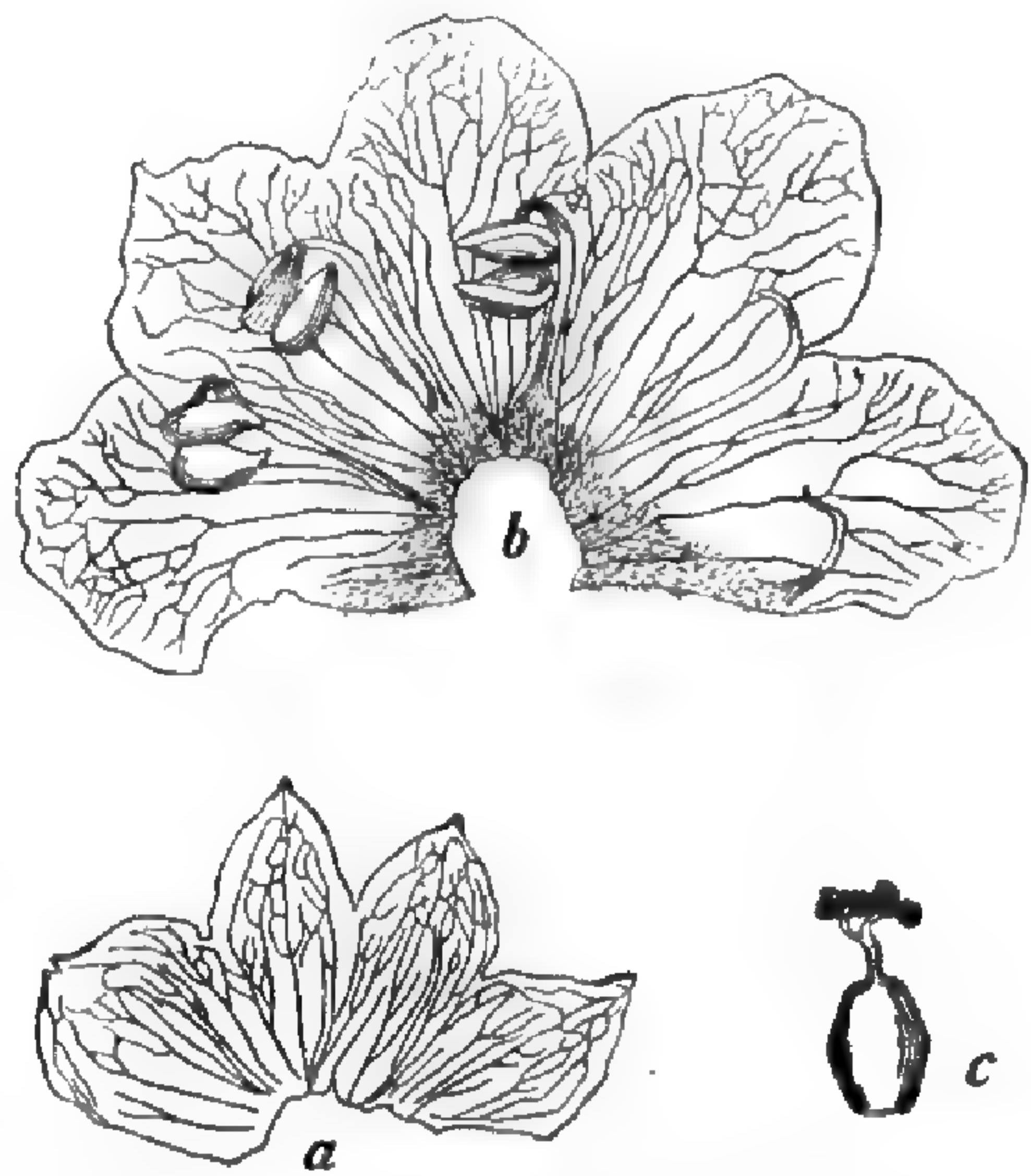


FIG. 101. — Floral detail of *Cordia eriostigma*. a, Calyx spread out; b, corolla spread out; c, pistil. Scale 2.

flowered, sparsely pilosulous before anthesis. Floral pedicels slender, 1 mm. long or less. Calyx tubular-campanulate, obsoletely 10-sulcate, about 5.5 mm. long, scarious, 3-lobulate at the apex, the lobules ovate-apiculate, one of them often 2-denticulate. Corolla white, the tube about 5.5 mm. long, broadening to the apex, the lobes 5, ovate-rounded, wide apart, reflexed. Stamens inserted near the corolla throat, exserted, the filaments villous at the base, the anther cells ovoid, broadly parted at the base. Pistil 5.5 mm. long, the ovary globose, the style first 2-branched, the branches bifid, each of the ultimate divisions ending in a clavate stigma.

Drupe not seen.

Type in the U. S. National Herbarium, no. 715984, collected in flower in open forest around Garachiné, southern Darién, Panama, February 12, 1912, by H. Pittier (no. 5694).

A member of the group of *Cordia nitida* Vahl, differing from that species in the shape of the leaves, the scarious, glabrous, and 3-lobulate calyx, the texture of the corolla, and the length of the stamens.

Cordia trichostyla Pittier, sp. nov.

FIGURE 102.

Section Myxa, subsection Laxiflorae. A small tree, 6 to 8 meters high, the branchlets terete, at first fuliginous-hairy, later glabrous.

Leaves coriaceous, the petioles broadly sulcate above, carinate beneath, 6 to 7 mm. long, fuliginous-hairy, the blades ovate or oblong, broader and rounded at the base, acute-acuminate at the apex, 10 to 18 cm. long, 4 to 7.5 cm. broad, scabrid above and dark green, the costa and veins subimpressed and ferruginous-pubescent, beneath paler, pubescent, reticulate, the costa and veins prominent.

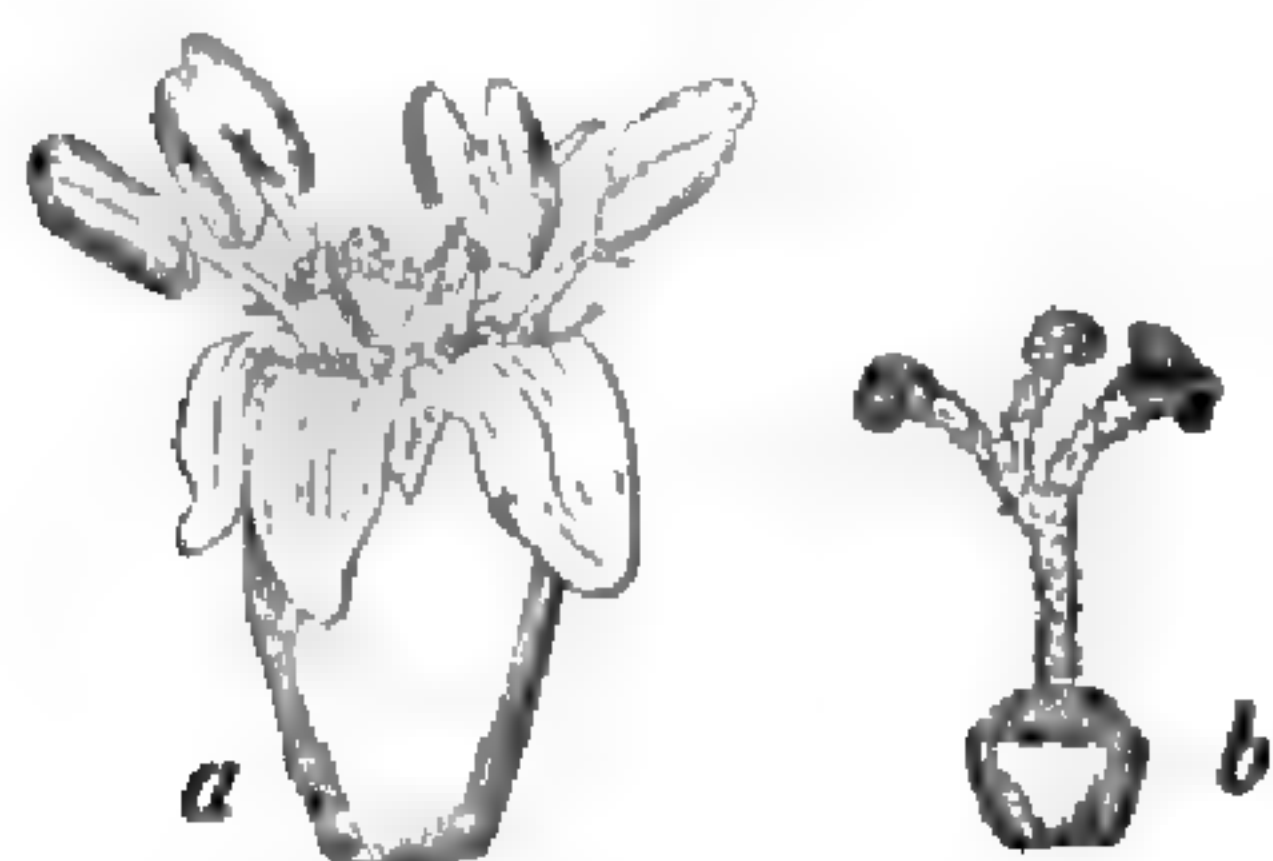


FIG. 102. — (a) Flower and (b) pistil of *Cordia trichostyla*. Scale 2.

Inflorescences terminal, cymose-paniculate, few-flowered, the rachis fuliginous-hairy. Flowers sessile; calyx tubular, attenuate to the base, about 5 mm. long, minutely pubescent without, 5-toothed, the teeth deltoid, about 1.2 mm. long; corolla white, tubular, narrow, deeply 5-lobulate, glabrous, the tube 4.5 to 5 mm. long, the lobes oblong, obtuse, reflexed, about 2.5 mm. long, 1.5 mm. broad; stamens 5, inserted about 1 mm. below

the apex of the interlobular sinus, long-exserted, the filaments densely setulose at the base, sparsely so to the apex, the anthers broad, with divaricate cells; ovary globose, minutely pubescent; style sparsely setulose, 3.5 to 4 mm. long, twice dichotomous, the ultimate branches each ending in a large, glabrous, rounded-depressed stigma.

Drupe globose, red.

Type in the U. S. National Herbarium, no. 472845, collected near Secanquim, Alta Verapaz, Guatemala, at an altitude of about 550 meters, in blossom, April 30, 1905, by H. Pittier (no. 189).

Cordia acuta Pittier, sp. nov.

FIGURE 103.

Section Myxa, subsection Spiciformes. A shrub, the branchlets subangulate, densely ferruginous-hairy.

Leaves subcoriaceous, the petioles canaliculate, 0.8 to 2.2 cm. long, ferruginous-tomentose, the blades ovate to ovate-elliptic, broadly cuneate at the base, acute at the apex, 6 to 14 cm. long, 2 to 5.5 cm. broad, dark green, impressed-reticulate and scabrous above, elevated-reticulate and softly hairy beneath, the costa and veins impressed above, prominent and ferruginous-tomentose beneath.

Floral spikes axillary, simple, few-flowered, and interrupted, the rachis angulate, ferruginous-hairy, up to 16 cm. long, free to the base (i. e. not adnate to the petiole). Flowers sessile; calyx broadly tubular-campanulate, about 3.5

mm. long, 5-toothed, sparsely villous-puberulous without, the teeth irregularly triangular, subacute, barbellate at the tip; corolla white, tubular, slightly widening to the apex, about 5 mm. long, irregularly sinuate on the margin, glabrous without, inside with a narrow hairy puberulous belt below the insertion of the stamens; stamens 5, glabrous, inserted at the middle of the corolla, included, the filaments slender, 1.7 to 1.9 mm. long, the anthers ovate; ovary depressed-globose, about 1.2 mm. in diameter; style about 2 mm. long, twice dichotomous, the stigmas clavate.

Drupe not seen.

Type in the U. S. National Herbarium, no. 530995, collected in old clearings at La Manuelita near Palmira, Cauca Valley, Colombia, altitude 1,100 to 1,300 meters, flowers, December 18, 1905, by H. Pittier (no. 808).

This belongs near *Cordia riparia* H. B. K. and *C. aubletii* DC., but differs in the size and pubescence of the flowers and in having the floral spikes free to the base, as well as in the size, shape, and indument of the leaves.

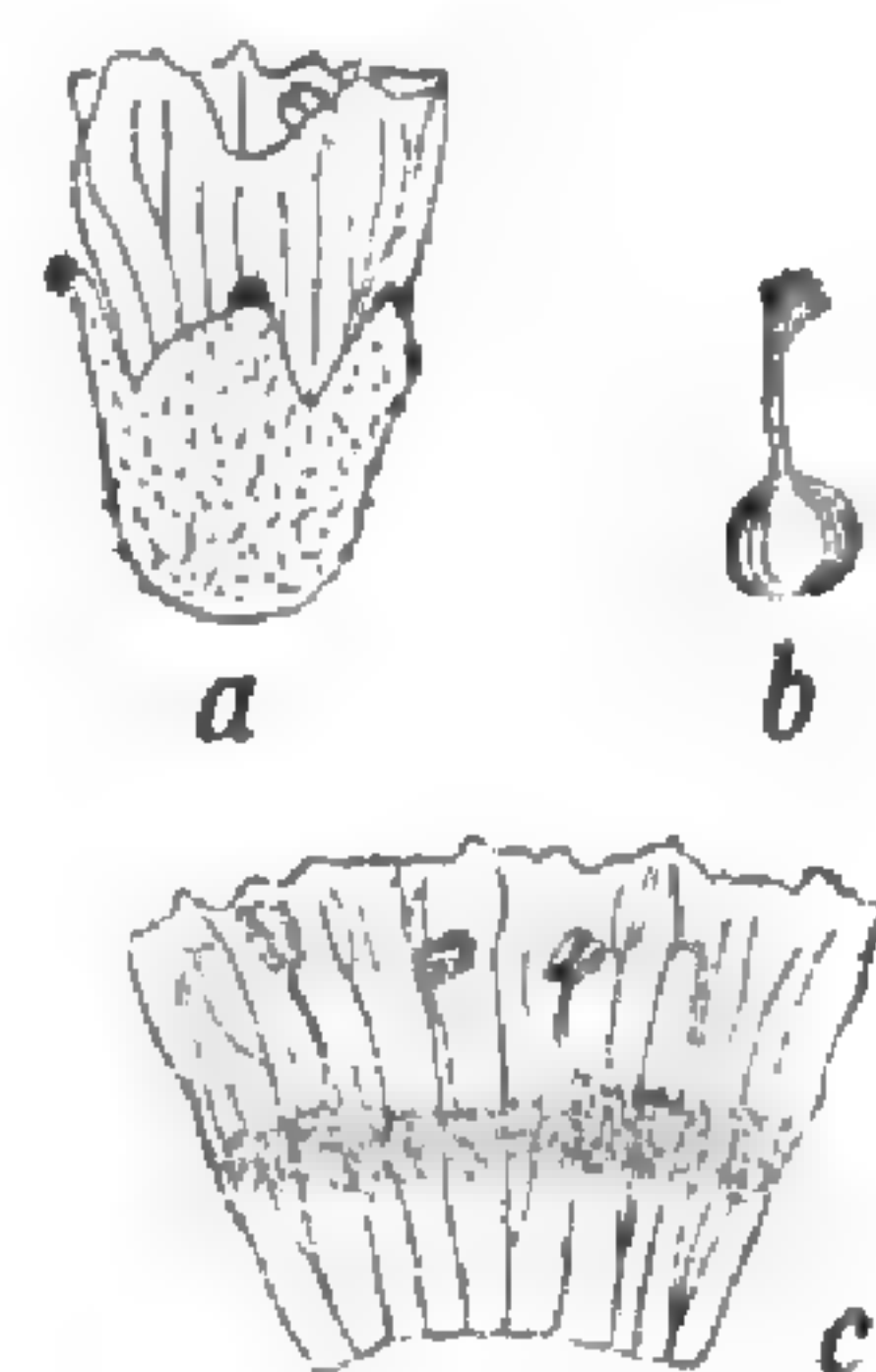


FIG. 103.—Flower and detail of *Cordia acuta*. a, Flower; b, pistil; c, corolla spread out. Scale 2.

***Cordia chepensis* Pittier, sp. nov.**

Section Myxa, subsection Spiciformes. A shrub, 1 to 2 meters high, the bark brownish, puberulous on the young growth.

Leaves coriaceous, entire, the petioles sulcate, puberulous, about 5 mm. long, the blades ovate-oblong, 5 to 8 cm. long, 2 to 3 cm. broad, acute-attenuate at the base, subacute or obtuse at the apex, scabrous above, the costa and veins immersed, beneath reticulate, softly hairy, the costa and veins prominent.

Inflorescence spiciform, terminal, simple, the rachis tomentose-puberulous, 6 to 10 cm. long. Flowers sessile; calyx tubular, about 3.5 mm. long, puberulous, 4-toothed, the teeth short, broadly acute-triangular; corolla white, tubular, minutely puberulous, densely brownish-hairy inside at the insertion of the stamens, the tube 5 mm. long, the lobes 5, broadly rounded, reflexed; stamens inserted a little above the middle of the corolla tube, exserted, the filaments glabrous, 1.2 to 1.5 mm. long, the anthers ovate; ovary obconical, glabrous; style 4-fid, each branch ending in a clavate stigma.

Drupe not seen.

Type in the U. S. National Herbarium, no. 679672, collected in flower, in the bushy margins of the savannas of Chepo, Panama, October 8, 1911, by H. Pittier (no. 4511).

Related to *Cordia cylindrostachya*, but differing in its broader, entire leaves, its larger flowers with a 5-toothed calyx, its exserted stamens, etc.

***Cordia littoralis* Pittier, sp. nov.**

FIGURE 104.

Section Myxa, subsection Spiciformes. A bushy shrub, about 2 meters high, the young branchlets brownish, glandular-puberulous.

Leaves submembranous, entire, the petioles thick, sulcate, 7 to 8 mm. long, puberulous, the blades ovate-lanceolate, 9 to 14 cm. long, 4 to 7 cm. broad, rounded-attenuate at the base, acute at the apex, rough, more or less puberulous, and finely impressed-reticulate above, beneath pubescent, reticulate, the venation prominent.



FIG. 104.—(a) Flower and (b) pistil of *Cordia littoralis*. Scale 2.

Inflorescence spicate, simple, terminal, the rachis tomentose-puberulous, 9 cm. long. Flowers sessile; calyx tubular, broad, contracted at the base, about 3.5 mm. long, 5-toothed, minutely puberulous without, the teeth irregular; corolla white, broad, tubular,

glabrescent without, densely hairy within below the insertion of the stamens, the tube about 5 mm. long, the 5 lobes shallow, broadly rounded, reflexed; stamens inserted above the middle of the corolla tube, glabrous, exserted, the filaments slender, the anthers ovate; ovary subglobose, subglabrous; style slender, 4-fid, the stigmas subfusiform, acute at the apex.

Drupe not seen.

Type in the U. S. National Herbarium, no. 678699, collected on the strand near Port Limón, Costa Rica, in flower, May 27, 1911, by H. Pittier (no. 3641).

A species near *Cordia peruviana*, but easily distinguished by the shape, texture, and indument of the leaves and the characters of the flowers.

***Cordia mollis* Pittier, sp. nov.**

Section Myxa, subsection Spiciformes. A shrub, the branchlets terete, sparsely lenticellate, at first villous-tomentose, later glabrescent.

Leaves subcoriaceous, the petioles canaliculate, tomentose, about 6 mm. long, the blades narrowly elliptic, acute-attenuate at the base, acute at the apex, 4 to 7 cm. long, 1 to 2.2 cm. broad, dark green above, tomentose, muriculate, the costa and veins impressed, canescent-tomentose beneath, the costa and veins subprominent and ferruginous-pubescent; margin irregularly serrate.

Inflorescence spicate, simple or subramose, terminal, the rachis tomentose, the peduncular part 6 to 7 cm. long, the spike usually compact and not interrupted. Flowers sessile; calyx tubular-campanulate, about 3 mm. long, 5-toothed, hairy without, the teeth deltoid, acute; corolla white, tubular, irregularly lobulate, glabrous without, hairy within below the insertion of the stamens, the tube about 4 mm. long, the lobes 1 to 1.5 mm. long, 1 mm. broad, rounded, with an irregularly sinuate margin; stamens very short (not over 1.5 mm. long), glabrous, inserted near the apex of the tube, exserted half their length; filaments slender; anthers ovate; ovary obpyriform, about 1.5 mm. long, glabrous; pistil glabrous, 3 to 3.5 mm. long, twice dichotomous, the ultimate divisions ending each in a clavate stigma.

Drupe not seen.

Type in the U. S. National Herbarium, no. 472788, collected between Chiquín and Trapiche Grande, on the road from Guatemala City to Salamá, Guatemala, at an altitude of about 900 meters, in flower, April 19, 1905, by H. Pittier (no. 134).

Closely related to *Cordia cylindrostachya* Roem. & Schult., but differing in the tomentose leaves, as well as in the long style and in other details of the flowers.

VERBENACEAE.

A SUBSTITUTE FOR A PREOCCUPIED NAME.

***Citharexylum macrochlamys* Pittier, nom. nov.**

Citharexylum macranthum Pittier, Contr. U. S. Nat. Herb. 18: 169. 1916, not von Hayek, Bot. Jahrb. Engler 42: 170. 1908.

Through an unfortunate oversight, the specific name "*macranthum*" was applied by me to a Panama tree, although already used by von Hayek to designate a Peruvian species.

BIGNONIACEAE.

FOUR NEW SPECIES OF ADENOCALYMNA.

***Adenocalymna anomalum* Pittier, sp. nov.**

An erect shrub or small tree, the bark gray, rimose, the newer growth lenticellate and more or less pilosulous.

Leaves bipinnate, the main rachis about 34 cm. long, terete, sparsely lenticellate, pilosulous, with large, swollen nodes; pinnæ 4-jugate, the rachis terete and pilosulous, with swollen nodes, the first pair 5-foliolate, its rachis about 10 cm. long, the second pair 3-foliolate, the rachis 7 cm. long, the third pair with one leaflet articulate on a rachis 1.3 cm. long, the single leaflets of the upper pair inserted directly on the main rachis; leaflets coriaceous, glabrous, articulate, the petiolules flat or shallow-sulcate above, 0.7 to 1.2 cm. long in the lateral leaflets, about 4 cm. in the terminal ones, the blades ovate-elliptic, acute at the base, with a swollen joint, acuminate at the apex, 10 to 16 cm. long, 3.5 to 8 cm. broad, paler and finely reticulate with prominent venation beneath; prophyllum stipulaceous, obovate-spatulate, glandular, 6 to 7 mm. long.

Inflorescence racemose, axillary, bracteate, growing from the old wood; racemes about 8 cm. long, the rachis thick, grayish-pubescent; bracts geminate, ovate-lanceolate, 1.5 cm. long, 0.6 cm. broad, sparsely hairy on both faces; pedicel thick, about 1 cm. long; bractlets geminate, ovate, conchoid, clasping, obtuse and often slightly emarginate at the apex, 2.5 cm. long, nearly 2 cm. broad when flattened; calyx tubular-campanulate, 1.2 to 2 cm. long, irregularly lobulate, open to the base on one side(?), glandular along the upper margin, minutely pilosulous without; corolla about 4.5 cm. long, funnelform-campanulate, yellow, glabrous without, hairy inside at the insertion of the stamens, the basal tube broad, about 7 mm. long, the lobes not seen; stamens didynamous, glabrous, the filaments incurved, 2.4 and 3.4 cm. long (the longer stamens reaching the base of the lobes), the anther cells divaricate, ovoid, 4 mm. long; staminode 5.5 mm. long, glabrous, spatulate at the apex; disc pulvinate, thick, 1.3 to 1.5 mm. high; pistil about 3 cm. long, the ovary elongate, slender, thicker at the apex, sparsely scaly, about 4.5 mm. long.

Fruit not known.

Type in the U. S. National Herbarium, no. 601679, collected on the Guinand Estate (Cárdenas), Siquire Valley, State of Miranda, Venezuela, in open meadows, flowers, March 19, 1913, by H. Pittier (no. 5963).

The specimens at hand are, unfortunately, scanty and not very complete, but the species evidently belongs to the *Euadenocalymnae* near *A. comosum* DC., differing from all other representatives of the genus in the compound leaves with very prominent articulations.

***Adenocalymna cocleense* Pittier, sp. nov.**

An erect, deciduous shrub, "the stems 5 cm. in diameter or more" (Williams in sched.), the young branchlets 4-angular, densely furfuraceous-tomentose.

Upper leaves all 3-foliolate, appearing with the flowers, the petioles terete, subsulcate, densely furfuraceous-tomentellous, 4.5 to 7.5 cm. long; petiolules canaliculate, furfuraceous-tomentellous, the middle one 1.5 to 2 cm., the lateral ones 0.7 to 1 cm. long; leaflet blades broadly ovate, rounded at the base, acute or subacuminate and mucronulate at the apex, 6 to 7.5 cm. long, 4 to 5.5 cm. broad, sparsely covered on both faces with short, branched hairs, the costa and veins more densely hairy; stipule-like phylla scarious, broadly triangular-acute, pubescent, about 3 mm. long.

Inflorescence terminal, short, the rachis, peduncles, and pedicels furfuraceous-tomentellous; bracts linear, boat-shaped, tomentellous without, glabrous within, up to 7 mm. long, early deciduous; bractlets inserted at the base of, and nearly as long as or longer than the pedicels, these about 6 mm. long; calyx tubular-campanulate, 7.5 mm. long, 5-toothed, furfuraceous-tomentellous without, eglandular, the margin ciliate, the teeth narrow, mucronate, wide apart; corolla straight, tubular-funnelform, pink within, whitish at the base, 4.7 to 5 cm. long, furfuraceous-tomentellous without, glabrous within except at the

insertion of the stamens, the lobes broadly ovate, obtuse, imbricate in the bud; stamens didynamous, glabrous, the filaments 11 and 14.5 mm. long, the anther cells divaricate, elongate, 3.5 mm. long; disc cupuliform, about 1 mm. high; pistil 2.7 cm. long; ovary ovoid, about 2 mm. long, minutely pubescent; style scaly at the base; stigma lobes oblong, obtuse or acute.

Capsule not known.

Type in the U. S. National Herbarium, no. 678125, collected in the vicinity of Penonomé, Province of Coelé, Panama, flowers, February 23 to March 22, 1908, by R. S. Williams (no. 522).

***Adenocalymna flos-ardeae* Pittier, sp. nov.**

A vine; young branchlets terete, striate, scaly-canescens.

Upper leaves submembranous, the leaflets conjugate; petioles and petiolules grayish scaly-pubescent, the former terete, 3 cm. long, the latter narrowly canaliculate, 2 to 3 cm. long; leaflet blades ovate-oblong, oblique, truncate or subemarginate and rounded at the base, obtuse, acute, or short-acuminate at the apex, 7 to 12 cm. long, 3.5 to 7 cm. broad, pilosulous on the costa, veins, and venules above, beneath prominently veined, reticulate, pubescent on the costa and veins, pilosulous on the venules, 5-veined at the base.

Inflorescences axillary, racemose, the peduncles up to 2 cm. long, scaly-pubescent, often with a small leaf at the base of the raceme, the racemes very short, few-flowered; bracts and bractlets linear, brownish-tomentellous, 3 to 5 mm. long; pedicels slender, 5 to 7 mm. long, furfuraceous-hairy; calyx narrowly campanulate, 5-lobulate, 9 mm. long, valvate in estivation, tomentellous-pubescent without, glabrous within; corolla tubular-funnelform, about 4 cm. long, yellowish white, minutely and sparsely scaly-pubescent without and on the inside of the lobes, glandular-hairy at the insertion of the stamens within, the narrow basal tube about 1 cm. long, the lobes short and rounded; stamens didynamous, glabrous, the filaments about 12 and 14 mm. long, the anther cells divaricate, 2.5 to 3 mm. long; staminode glabrous, short; disc pulvinate, about 1 mm. high; pistil about 35 mm. long, the ovary oblong, 1.5 to 2 mm. long, 2-sulcate, scaly, the ovules numerous, 2-seriate in each cell; style glabrous; stigma lobes lanceolate.

Capsule not seen.

Type in the U. S. National Herbarium, no. 678976, collected along Río Fató, Province of Colón, Panama, in thickets, flowers, July 9, 1911, by H. Pittier (no. 3898).

Known among the natives as "bejuco de garza." This species apparently belongs to section *Hanburyophyton* Bur. & Schum., near *A. laevigatum* and *A. asperulum* Bur. & Schum., both from southern Brazil.

***Adenocalymna hosmeca* Pittier, sp. nov.**

A vine, the bark grayish, the young branchlets herbaceous, glabrous.

Upper leaves submembranous, glabrous, the petioles terete, 2.4 to 2.8 cm. long; leaflets conjugate, the petiolules 1.8 to 2 cm. long, flattened above, the blades ovate, broadly rounded at the base, subacuminate and obtuse at the apex, 6 to 9.5 cm. long, 5 to 6.5 cm. broad, reticulate; tendrils slender, 3-fid at the apex, usually caducous but sometimes persistent, thickened and ligenous, then branchless at the end.

Inflorescences axillary, paniculate, bearing a leaf at the base, the rachis trichotomous, glabrous; floral pedicels articulate, 0.5 to 1 cm. long, bearing at the base 2 minute, hairy bractlets; calyx tubular, 8 mm. long or less, truncate, minutely and sparsely stellate, the margin ciliate, bearing 5 minute, remote teeth; corolla funnelform, 4.3 cm. long, pinkish white at the base, purplish on the lobes, glabrous without, glandular-pubescent within at the insertion of the

stamens, the lobes broadly rounded and acuminate; stamens didynamous, the filaments glabrous, 1.3 and 2 cm. long, the anther cells divaricate, about 3.5 mm. long, minutely hairy; staminode filiform, short, circinate at the apex; disc thick, 1.5 to 2 mm. high; style about 3 cm. long, the ovary elongate, compressed, 5 mm. long, carinate on the faces, densely scaly; style filiform; stigma lobes broadly lanceolate.

Fruit not known.

Type in the U. S. National Herbarium, no. 861399, collected between Cangel and El Corozal, Guanacaste, Costa Rica, flowers, February, 1912, by Otón Jiménez (no. 374).

Collected also near Nicoya, Costa Rica, in thickets, flowers, February, 1900, by A. Tonduz (Inst. Fís. Geogr. Costa Rica, no. 13830).

This species, which emits a strong odor of garlic, also belongs to the section *Hanburyophyton*, but comes close to *A. alliaceum* Miers. "Hosmeca" is the native name.

NEW SPECIES OF SEVERAL GENERA.

Clytostoma isthmicum Pittier, sp. nov.

PLATE 106.

A vine with slender stems, the new branchlets subquadrangular, striate, more or less puberulous.

Leaves conjugate, the petioles subterete, more or less distinctly canaliculate, 1 to 2.5 cm. long; leaflets coriaceous, the petiolules canaliculate, 1 to 1.5 cm. long, sometimes puberulous, the blades ovate, oblong, or elliptic, acute at the base, more or less abruptly acuminate at the apex, 7 to 15 cm. long, 3 to 6.5 cm. broad, reticulate and sparsely scaly on both faces, paler beneath; tendrils very slender.

Inflorescences axillary or terminal, the flowers long-pedicellate, 1 to 4 in the cluster; peduncle subangular, 1.5 to 2 cm. long, provided near the base with a pair of lanceolate, acute bracts 3 to 4 mm. long; pedicels slender, 1 to 2 cm. long, minutely pilosulous toward the apex, provided at the base with 2 ovate, acute bractlets about 2 mm. long, and sometimes a second pair of setaceous, pilosulous bractlets; calyx cupuliform, truncate, minutely 5-toothed, about 4.5 mm. long, sparsely glandular below the teeth, ciliolate on the margin, very sparsely scaly; corolla tubular-campanulate, 5 to 6 cm. long, pale pink, sparsely scaly without, the 5 lobes broad and rounded-ovate; stamens didynamous, included, the longer ones about 1.6 cm. long, inserted on the tube about 6 mm. from its base; staminode filiform; anther cells about 2.7 mm. long, minutely pilosulous; disk very low (about 0.5 mm. high), crenulate; pistil about 32 mm. long, the ovary sessile, compressed-ovoid, 2 mm. long, densely muriculate, the ovules numerous, 2-seriate in each cell.

Capsule subdiscoïd, 5 cm. long, 4.5 cm. broad, 2.2 cm. thick, echinate, the prickles 7 to 9 mm. long, the valves convex, divided at base and apex, the peduncle stout, 1.5 cm. long; seeds suborbicular, 1.7 cm. long, 2 cm. broad, including the coriaceous wings.

Type in the U. S. National Herbarium, no. 679092, collected along the Trinidad River, Canal Zone, Panama, near sea level, among bushes, flowers and fruits, July 19, 1911, by H. Pittier (no. 4008).

OTHER COLLECTIONS:

PANAMA: Marragantí, southern Darién, fruits, April 9, 1908, *Williams* 690.

Along Chagres River, from Juan Mina to El Vigía, common among bushes, flowers, May 11 to 14, 1911, *Pittier* 3452. Around Pinogana, southern Darién, in clearings, flowers, April 16, 1914, *Pittier* 6526.

This new species belongs to a genus considered heretofore to be confined to Brazil and the territory southward, with the exception of *C. noterophilum* Bur. & Schum., reported from French Guiana.

EXPLANATION OF PLATE 106.—Fruit of *Olytostoma isthmicum*. Natural size.

***Lundia puberula* Pittier, sp. nov.**

A vine, the young branchlets puberulous, sparsely covered with elliptic, brownish lenticels.

Leaves conjugate; petioles and petiolules terete, puberulous, the former 2 to 2.5 cm. long, the latter canaliculate, 1.5 to 2 cm. long; leaflet blades ovate-acuminate at the apex, oblique, rounded-emarginate at the base, 6 to 9 cm. long, 2.5 to 5 cm. broad, reticulate, glabrous, and almost lustrous above, paler beneath, finely reticulate, the costa and veins puberulous and barbate in the axils.

Inflorescence paniculate, terminal, many-flowered, the rachis puberulous; bracts narrow, acute, pubescent, about 1 mm. long; flowers clustered at the ends of the peduncles, these 0.8 to 2.5 cm. long; bractlets linear, pubescent, about 2 mm. long, caducous; pedicels minutely puberulous, 4 to 5 mm. long; calyx tubular, truncate, about 5 mm. long, minutely puberulous without, sometimes split laterally; corolla about 3.5 cm. long, pinkish purple, pubescent without, glabrous within, the narrow basal tube 1 cm. long, the lobes rounded-obtuse; stamens inserted at the upper end of the basal tube, included, the filaments 9.5 and 14.5 mm. long, the anther cells divaricate, subfalcate, long-ciliate, 2.3 to 2.8 mm. long; staminode obsolete; disc none; pistil about 2.8 cm. long, the ovary ovoid-oblong, 2 mm. long, minutely white-tomentose, the style smooth, the stigma lobes narrow.

Fruit not known.

Type in the U. S. National Herbarium, no. 715745, collected at La Palma, southern Darién, Panama, flowers, January 26, 1912, by H. Pittier (no. 5499). The species is apparently common in old clearings.

This belongs in the section *Eulundia* Schum., near *Lundia obliqua* Sond., from which it differs in its conjugate leaflets, glabrous on the upper face, eglandular at the base, its many-flowered panicles, its anther cells closely ciliate along the line of dehiscence, etc.

***Jacaranda caucana* Pittier, sp. nov.**

A middle-sized, deciduous tree, the trunk erect, the crown elongate; young branchlets minutely puberulous.

Leaves unequally twice pinnate, the main rachis 8.5 to 20 cm. long, narrowly canaliculate, minutely hairy, the rachis of the pinnæ 1.5 to 5 cm. long, semi-terete, broadly canaliculate, minutely hairy; leaflets 7 to 20-jugate, subopposite or alternate, sessile, ovate-oblong, rounded and very oblique at the base, subacute at the apex, sparsely villous above, paler and more densely villous or subtomentose beneath, the 4 pairs of veins strongly impressed on the upper face of the blade, slightly prominent on the lower face, the margin revolute; terminal leaflet 7 to 10 mm. long, 3 mm. broad; lateral leaflets 4 to 6 mm. long, 1.5 to 2 mm. broad.

Panicles terminal, their main branches about 15 cm. long, the rachis and pedicels minutely puberulous; branchlets dichotomous; bractlets very small, triangular-acute; pedicels 2 to 4 mm. long; calyx broadly cupuliform, about 3 mm. long, minutely pubescent, distinctly 5-toothed; corolla funnelform-campanulate, subzygomorphic, about 4 cm. long, blue, glabrous without except for sparse white hairs near the apex, hairy within on the veins and glandular-hairy at the insertion of the stamens, the tube swollen at the base and then contracted and curved, the lobes broad and rounded; stamens equally inserted in

the corolla tube, included, about 1 cm. long, the filaments arcuate, glabrous, the anther cell ovate-acuminate; staminode about 22 mm. long, glabrous at the base, then long glandular villous to the thick clavate apex; disc cupuliform, thin, glabrous; ovary sessile, ovate, about 3 mm. long, densely white-tomentose; style glabrous, about 18 mm. long, the lobes of the stigma ovate-oblong.

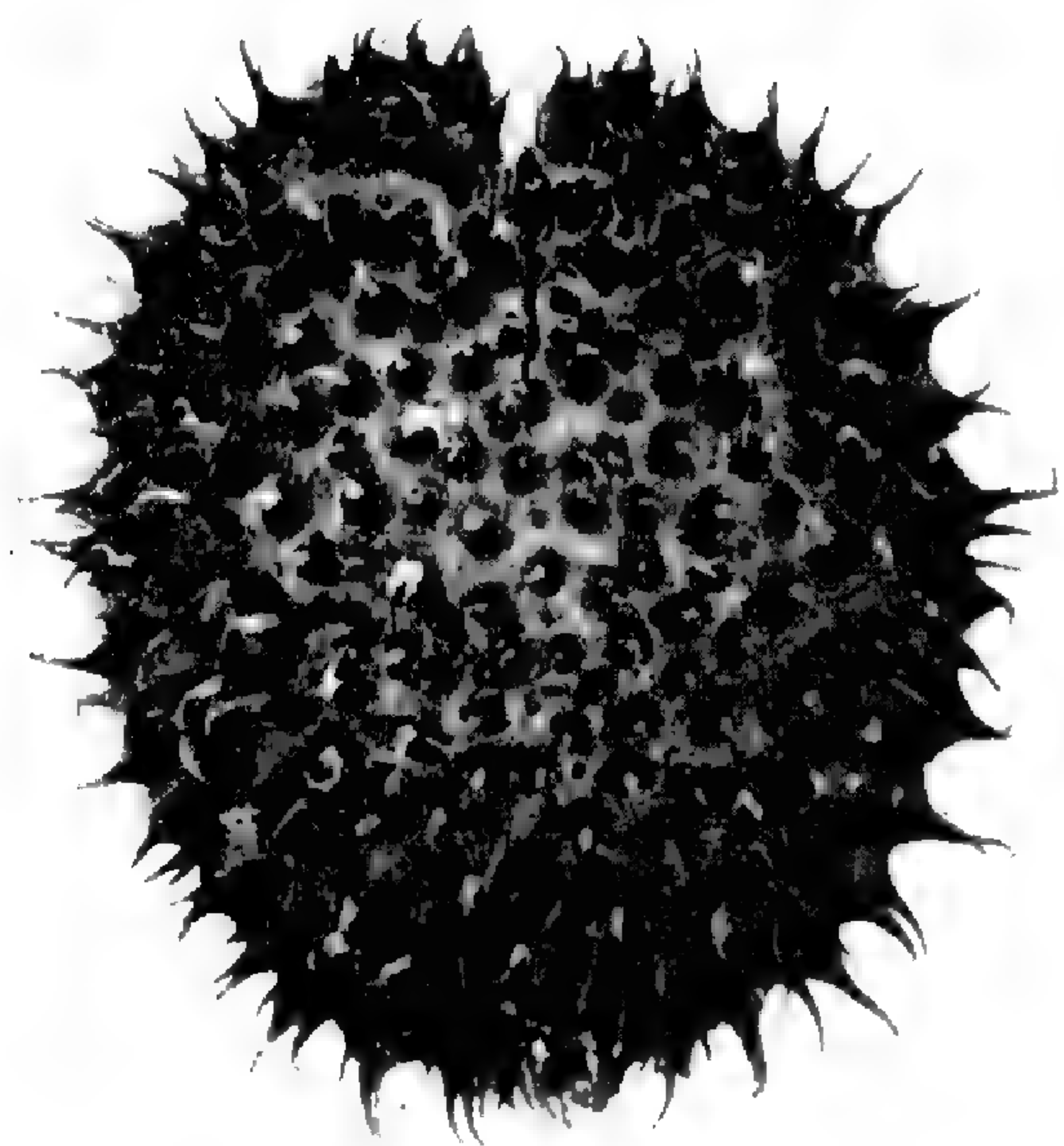
Capsule depressed-ovoid, substipitate at the base, obtuse or emarginate at the apex, 7 cm. long, 5 to 5.5 cm. broad, about 2 cm. thick, the valves woody, glabrous, sparsely dotted with whitish glands, sinuate on the margin; seeds brownish, rough on the surface, 1 cm. long, 3.2 cm. broad, including the hyaline wings.

Type in the U. S. National Herbarium, no. 531119, collected in a garden at Cali, Cauca, Colombia, flowers and fruits, January 1, 1906, by H. Pittier (no. 925).

By the tomentose ovary this is brought near *J. lasiogyne* Bur. & Schum., but it differs in the villous leaflets, the narrower rachis of the pinnæ, and the shape and size of the fruit. It has also the inflated base of the corolla found in that species and in *J. flicifolia*, with which latter it can not be confused.

Jacaranda caucana is a favorite with the natives of the Cauca Valley, on account of its beautiful blue flowers. They call it "gualandai." The specimens in the U. S. National Herbarium were collected in a garden, but the tree was said to grow wild in the district surrounding Cali. In the Flora de Colombia, by S. Cortés, we find mentioned on page 99 a *Jacaranda gualanday*, from Cundinamarca, given as synonym of *J. mimosifolia* D. Don. There is, however, nothing to indicate that the species is the same as the one from Cali, since no description is given. Furthermore, *J. mimosifolia* is but another name for *J. acutifolia*, which is quite distinct from *J. caucana*. If then *J. gualanday* Cortés, a hyponym, is really a synonym of *J. mimosifolia*, it has no standing, and besides it would not apply to the Cauca tree.

Jacaranda caucana probably blossoms twice in the year. At the time of my visit in the Cauca Valley there was only a scanty flowering, and it was said that the time to see the trees in their full glory was about July or August. In July they drop their leaves, and the flowers immediately follow.



FRUIT OF CLYTOSTOMA ISTHMICUM PITTIER.

INDEX.

[Synonyms in *italic*. Page numbers of principal entries in heavy-face type.]

	Page.		Page.
Adenocalymna alliaceum -----	257	Cordia lasiocalyx -----	251
<i>anomalum</i> -----	254	<i>littoralis</i> -----	253
<i>asperulum</i> -----	256	<i>mollis</i> -----	254
<i>cocleense</i> -----	255	<i>nitida</i> -----	251, 252
<i>comosum</i> -----	255	<i>peruviana</i> -----	254
<i>flos-ardeae</i> -----	256	<i>riparia</i> -----	253
<i>hosmeca</i> -----	256	<i>trichostyla</i> -----	252
<i>laevigatum</i> -----	256	Coumarouna oleifera -----	236
Andira chiricana -----	235	<i>panamensis</i> -----	236
<i>fraxinifolia</i> -----	235	Coussapoa asperifolia -----	226
Balata -----	250	<i>brevipes</i> -----	225, 226
Bejuco de garza -----	256	Central American species-----	226
Cecropia arachnoidea -----	226	<i>fontanesiana</i> -----	226
<i>asperrima</i> -----	227	<i>martiana</i> -----	226
Isthmian species-----	228	<i>panamensis</i> -----	226
<i>longipes</i> -----	227, 228	<i>villosa</i> -----	226
<i>maxonii</i> -----	228	Dipterae (section of Terminalia) ---	239
<i>obtusa</i> -----	227	Embothrium grandiflorum -----	231
<i>ruiziana</i> -----	228	<i>ruizii</i> -----	230, 231
Cespedesia macrophylla -----	238	section <i>Oreocallis</i> -----	231
Chaenantha (section of <i>Miconia</i>)--	249	Euadenocalymnae (section of <i>Adeno-</i>	
Citharexylum macranthum -----	254, 255	<i>calymna</i>)-----	255
<i>macrochlamys</i> -----	254	Eucomarouna (section of <i>Couma-</i>	
Clytostoma isthmicum -----	257	<i>rouna</i>)-----	236
<i>noterophilum</i> -----	258	Eumiconia (section of <i>Miconia</i>)----	248
Combretum -----	225, 239	Eumimusops (section of <i>Mimusops</i>)--	250
<i>alternifolium</i> -----	246, 247, 248	Gutta-percha -----	250
<i>argenteum</i> -----	240, 241, 244, 246	Hanburyophyton (section of <i>Adeno-</i>	
<i>benthamianum</i> -----	240, 241, 245	<i>calymna</i>)-----	256
<i>coccineum</i> -----	240	Hosmeca -----	257
<i>epiphyticum</i> -----	247	Jacaranda acutifolia -----	259
<i>erianthum</i> -----	240, 241, 245	<i>caucana</i> -----	258, 259
<i>farinosum</i> -----	239,	<i>filicifolia</i> -----	259
240, 241, 242, 243, 244, 246		<i>gualanday</i> -----	259
<i>phaenopetalum</i> -----	243	<i>lasiogyne</i> -----	259
<i>jacquinii</i> -----	247	<i>mimosifolia</i> -----	259
<i>lepidopetalum</i> -----	240, 241, 245	Laxiflorae (subsection of <i>Cordia</i>)--	251, 252
<i>leprosum</i> -----	240	Lundia obliqua -----	258
<i>loeflingii</i> -----	239	<i>puberula</i> -----	258
<i>mellifluum</i> -----	240	Macrolobium floridum -----	233
<i>nicoyanum</i> -----	247	Malvecino -----	234
<i>phaenopetalum</i> -----	240, 241, 243	Manilkaria (section of <i>Mimusops</i>)--	250
<i>polystachyum</i> -----	240, 241, 243	Miconia darienensis -----	248
<i>punctulatum</i> -----	248	<i>fulva</i> -----	249
<i>sambuense</i> -----	240, 241, 242	<i>poeppigii</i> -----	249
section <i>Micropetalae</i> -----	241	<i>pyrifolia</i> -----	249
<i>superbum</i> -----	240, 241, 242	Micropetalae (section of <i>Combretum</i>)	239
<i>warcewiczianum</i> -----	240, 245	<i>Mimusops darienensis</i> -----	225, 249, 250
Cordia acuta -----	252	<i>longifolia</i> -----	250
<i>aubletii</i> -----	253	<i>spectabilis</i> -----	250
<i>chepensis</i> -----	258	Myxa (section of <i>Cordia</i>)-----	251, 252, 254
<i>cylindrostachya</i> -----	253, 254		
<i>erlostigma</i> -----	251		

	Page.		Page.
Oreocallis (section of Embotrium) -	231	Schizolobium kellerianii -	232
<i>ruizii</i> -	230	Spiciformes (subsection of Cordia) -	252, 253, 254
Paniculares (subsection of Miconia) -	248	Sweetia panamensis -	234
Platypodium elegans -	235	Terminalia -	239
maxoniana -	234	buceras -	239
Roupala darriensis -	228, 229, 230	chiriquensis -	238
gardneri -	229, 230	excelsa -	239
dentata -	230	hayesii -	239
glaberrima -	229	obovata -	239
loranthoides -	229	Ternaria (section of Mimosa) -	250
nitida -	229	Vochysia ferruginea -	237, 238
panamensis -	229	tomentosa -	237
Schizolobium covilleana -	231, 233		
excelsa -	232, 233		

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VOLUME 18, PART 7

GRASSES OF THE WEST INDIES

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II

P R E F A C E.

The accompanying paper by A. S. Hitchcock, Systematic Agrostologist of the United States Department of Agriculture, and Agnes Chase, Assistant Agrostologist, brings together in a single convenient publication our knowledge of the grass flora of the West Indian Islands. Though some of the earliest collections of plants sent from America to Europe came from the West Indies, and though the flora of this region has since been studied by many botanists, no account of the grasses of the whole region has hitherto been published. The present paper is based upon large collections from practically all the islands of the group and upon field studies by both authors. It includes 110 genera and 455 species, of which one genus and 17 species are new. The new genus, *Saugetia*, is named in honor of Brother León, Joseph Sylvestre Sauget, of the Colegio de La Salle, Habana, one of the most active of Cuban botanists.

The brief descriptions, giving the salient characteristics of the species and genera, are intended to supplement the keys and confirm identifications. To facilitate the use of the work as a manual the detailed citation of specimens under each species is omitted. Appended to the paper, however, is a list of all the numbered specimens of West Indian grasses in the United States National Herbarium.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

CONTENTS.

	Page.
Introduction.....	261
Descriptive list, with keys.....	264
Doubtful species.....	401
List of new genera and species and new names.....	403
Catalogue of specimens in the United States National Herbarium, arranged by collectors' names and numbers.....	405
Index.....	VII

GRASSES OF THE WEST INDIES.

By A. S. HITCHCOCK and AGNES CHASE.

INTRODUCTION.

The term West Indies as here used includes Bermuda, the Bahamas, Trinidad, and Tobago, but excludes the Dutch Islands off the coast of Venezuela. Trinidad and Tobago belong floristically to South America but are here included with the West Indies because they were so included by Grisebach in his *Flora of the British West Indian Islands*.

The flora of the West Indies has been studied from an early date. It is fortunate for the student of this flora that many of the tropical American species described in early works were based upon specimens collected in these islands. The literature of the West Indian flora is reviewed by Urban,¹ who gives also biographical sketches of botanical collectors who have traveled in the West Indies. The most important works are the following:

Sloane, Hans. A voyage to the islands Madera, Barbados, Nieves, S. Christopher, and Jamaica * * *. Vol. 1, 1707. Vol. 2, 1725. The chief importance of this work is due to the fact that the plates are often cited by Linnæus and others in connection with the descriptions of plants and help to determine the types of the species described. The plants described by Sloane are in the Sloane Herbarium at the British Museum of Natural History.²

Browne, Patrick. The civil and natural history of Jamaica. 1756. Binomials are not used in this work. Browne sent a small collection of Jamaican plants to Linnæus. These are in the Linnæan Herbarium and may be recognized by the letters "Br." upon the sheets. These plants were described by Linnæus in the tenth edition of the *Systema Naturae* (1759) and by Elmgren, a pupil of Linnæus, in a pamphlet entitled *Plantarum Jamaicensium Pugillus* (1759). The latter was included by Linnæus in the *Amoenitates Academicæ*, volume 5 (1760).

Swartz, Olof. *Nova genera et species plantarum seu prodromus descriptionum vegetabilium*. 1788. Swartz's plants are preserved in the Natural

¹Symb. Antill. 1. 1898.

²See Hitchcock, The grasses of Sloane's history of Jamaica. Contr. U. S. Nat. Herb. 12: 131. 1908.

History Museum at Stockholm.¹ They were more completely described in a later work entitled *Florae Indiae Occidentalis* (vol. 1, 1797; vol. 2, 1800; vol. 3, 1806). The grasses were mostly from Jamaica.

Hamilton, W. *Prodromus plantarum Indiae Occidentalis*. 1825. Several grasses are described, mostly from specimens in the herbarium of Professor A. N. Desvaux.

Sagra, R. de la. *Historia física política y natural de la isla de Cuba*. Volumes 9 to 12 are devoted to botany, the grasses being described by Richard in volume 11 (1850).

Grisebach, A. H. R. *Flora of the British West Indian Islands*. 1864. The type specimens are mostly in the herbarium at Göttingen, though many are in the Kew Herbarium. Many Cuban grasses are described in his *Catalogus plantarum cubensium* (1866).² In his "*Vegetation der Karaiben*"³ there is an annotated list of the grasses of the Lesser Antilles.

Husnot, T. and Coutance A. *Énumération des Glumacées récoltées aux Antilles françaises*. 1871. An annotated list.

Wright, C., and Sauvalle, F. A. *Flora Cubana*. 1873.⁴

Urban, I. *Symbolae antillanae*. 1898 et seq. In this work Pilger has described several grasses. An account of the grasses of Porto Rico is found in the *Flora Portoricensis*.⁵ The Krug and Urban Herbarium was lent in 1912-13 to the U. S. National Herbarium for study. In this herbarium are many Bertero specimens, some the types or duplicates of types of species described by Sprengel, together with collections of Rugel, Linden, Wulfschlaegel, Sieber, and others.

Nash, G. V. Preliminary enumeration of the grasses of Porto Rico. *Bull. Torrey Club* 30: 369-389. 1903.

Hitchcock, A. S. Catalogue of the grasses of Cuba. *Contr. U. S. Nat. Herb.* 12: 183-258. 1909. Here are given details concerning the collections of Wright in Cuba and regarding the works of Grisebach and of Wright and Sauvalle, based mainly upon Wright's collections.

The present paper is based primarily upon the study of collections in the United States National Herbarium. At the end of this article all these specimens are listed with their identifications. For this reason the citation of specimens under each species is limited to the relatively rare species. Several other important herbaria have been consulted and specimens contained therein have been considered in defining the range of the different species.

Among the more important collections examined may be mentioned Wright's Cuba plants, of which the first set is in the Gray Herbarium, the United States National Herbarium having a nearly complete set of duplicates; those of Brother León, of the Colegio de la Salle, Habana, the richest single collection of Cuba grasses that has been made, a practically complete set of which Brother León has contributed to the National Herbarium; the collections of Harris

¹ See The West Indian grasses described by Swartz. *Contr. U. S. Nat. Herb.* 12: 135. 1908.

² See in this list, Hitchcock, A. S., Catalogue of the grasses of Cuba.

³ *Abh. Ges. Wiss. Göttingen* 7: 260-266. 1857.

⁴ *Symb. Antill.* 4: 76-100. 1903.

from Jamaica, most fully represented in the New York Botanical Garden Herbarium; those of Sintenis from Porto Rico, Eggers from St. Thomas, and Ricksecker from St. Croix; those of Duss from Martinique and Guadeloupe, the original set of which is at the New York Botanical Garden; those of Broadway from Tobago and Trinidad; and also the recent collections made by Dr. N. L. Britton and other members of the staff of the New York Botanical Garden, who have visited nearly all parts of the West Indies. The herbarium of the Botanical Garden, Port of Spain, Trinidad, contains a large collection of Trinidad plants made by successive superintendents of the garden.¹ This collection was examined by Mr. Hitchcock during his visit to Trinidad.

The senior author first visited the West Indies in 1890. An account of this trip was given in a paper entitled "List of Plants Collected in the Bahamas, Jamaica, and Grand Cayman."² In 1906 he visited Cuba, collecting in the Provinces of Habana and Pinar del Río. In 1912 he visited Jamaica, Trinidad, and Tobago. During this second visit to Jamaica Mr. Hitchcock was greatly aided by Mr. William Harris, Superintendent of Public Gardens, Hope Gardens. He was similarly aided in Trinidad by Mr. W. G. Freeman, Assistant Director of Agriculture, Port of Spain. Mr. W. E. Broadway, Superintendent of the Experiment Station at Scarborough, extended many courtesies to him while in Tobago. The junior author visited Porto Rico in 1913, where her work was greatly forwarded by Dr. F. L. Stevens, then Dean of the College of Agriculture, Mayaguez.

The citation of synonymy is not complete; names based upon collections from elsewhere than the West Indies are usually not given unless they occur in some of the works on the West Indian flora. An attempt has been made to account for names based upon West Indian material, but only by an exhaustive search through literature can the synonymy be completed.

The descriptions of the genera and species are usually merely diagnostic and are intended to supplement the keys.

Common names have been added in those cases where the grass is definitely known by an English name over a considerable area. To several Cuban species are appended vernacular names which were obtained in part from the Flora de Cuba³ and in part were communicated by Brother León⁴ and by Professor Roig.

¹ See Herbarium List. Botanical Department, Trinidad. Compiled and edited by J. H. Hart, Superintendent. 1908.

² Ann. Rep. Mo. Bot. Gard. 4: 47-179. 1893.

³ De la Maza, M. G., and Roig, J. T. Flora de Cuba. Est. Exp. Agron. Bol. 22. 1914.

⁴ Brother León's communication includes information on common names furnished by Sr. D. Rafael Garteiz, San Rafael Sugar Estate, near Victoria de las Tunas, the names based upon specimens.

DESCRIPTIVE LIST, WITH KEYS.

KEY TO THE TRIBES.

Series 1. PANICATAE.

Spikelets with 1 perfect terminal floret (disregarding the few monœcious genera and the staminate and neuter spikelets) and a sterile or staminate floret below, usually represented by a sterile lemma only, one glume sometimes, rarely both glumes, wanting; articulation below the spikelets, either in the pedicel, in the rachis, or at the base of a cluster of spikelets, the spikelets falling entire, either singly, in groups, or together with joints of the rachis; spikelets, or at least the fruits, more or less dorsally compressed (laterally in *Lithachne*).

Glumes indurate; fertile lemma and palea hyaline or membranaceous, the sterile lemma like the fertile one in texture.

Inflorescence monœcious, the pistillate spikelets below, the staminate above on the same rachis-----1. **TRIPSACEAE** (p. 265).

Inflorescence not monœcious, the fertile spikelets perfect, each usually paired with a sterile spikelet.

Spikelets in pairs, one sessile, the other pedicellate (the pedicellate sometimes obsolete); lemmas hyaline.

2. **ANDROPOGONEAE** (p. 265).

Spikelets all alike, solitary or in groups of 2 or 3; lemmas membranaceous-----3. **NAZIEAE** (p. 266).

Glumes membranaceous; fertile lemma and palea indurate or at least as firm as the glumes; sterile lemma like the glumes in texture.

Fertile lemma and palea scarcely firmer than the glumes.

4. **MELINIDEAE** (p. 266).

Fertile lemma and palea indurate or subindurate, usually much firmer than the glumes-----5. **PANICEAE** (p. 267).

Series 2. POATAE.

Spikelets 1 to many-flowered, the reduced florets, if any, above the perfect florets (except in *Phalarideae*; sterile lemmas below as well as above in *Uniola*); articulation usually above the glumes.

Plants woody, usually arborescent, clambering, or climbing (scarcely woody in *Planotia*-----13. **BAMBOSEAE** (p. 272).

Plants herbaceous.

Spikelets with 2 sterile or rudimentary lemmas unlike and below the fertile lemma -----7. **PHALARIDEAE** (p. 269).

Spikelets without sterile lemmas below the perfect floret (or these rarely present but like the fertile ones).

Spikelets articulate below the glumes, 1-flowered, either much compressed or if not then unisexual, never in dense spikes; glumes often reduced, sometimes wanting-----6. **ORYZAEAE** (p. 269).

Spikelets articulate above the glumes or, if below, spikelets 2 or more flowered (*Notholcus* and *Sphenopholis*) or in dense racemose spikes (*Spartina*).

Spikelets sessile on a continuous rachis, forming spikes (short-pedicellate in *Leptochloa* and *Gouinia*).

Spikelets on opposite sides of the rachis; spike terminal, single-----12. **HORDEAE** (p. 272).

Spikelets on one side of the rachis; spikes usually more than 1, digitate or racemose (see also *Streptogyne* with tendril-like stigmas)-----10. **CHLORIDEAE** (p. 270).
Spikelets pedicellate in open or contracted panicles.

Spikelets 1-flowered; leaf blades never broad and net-veined.
8. **AGROSTIDEAE** (p. 269).

Spikelets 2 to many-flowered (often reduced to 1 floret and a prolonged rachilla joint, in *Orthoclada*, this with net-veined blades).

Glumes as long as the lower floret, usually as long as the spikelet; lemmas awned on the back (except in *Koeleria* and *Sphenopholis*)--9. **AVENEAE** (p. 270).

Glumes shorter than the first floret; lemmas awnless or awned from the tip (from a bifid apex in *Bromus*).
11. **FESTUCEAE** (p. 271).

KEY TO THE GENERA.

1. **TRIPSACEAE.**

Pistillate spikelets sunken in recesses in the thickened joints of the rachis; inflorescence of solitary or digitate spikes-----1. *Tripsacum* (p. 272).
Pistillate spikelets inclosed in a bony beadlike involucre-----2. *Coix* (p. 272).

2. **ANDROPOGONEAE.**

Spikelets all perfect.

Inflorescence of 2 to several digitate racemes-----7. *Ischaemum* (p. 274).

Inflorescence a densely flowered hairy panicle.

Spikelets awned -----6. *Erianthus* (p. 274).

Spikelets awnless.

Rachis continuous-----3. *Imperata* (p. 272).

Rachis disarticulating-----4. *Saccharum* (p. 273).

Spikelets not all perfect, the sessile usually perfect, the pedicellate usually staminate or rudimentary (pistillate in *Eriochrysis*).

Fertile spikelet with a hairy-pointed callus formed of the attached supporting rachis joint or pedicel or of the upper part of the peduncle; awns usually long.

Racemes reduced to a single joint, long-peduncled in a simple open panicle-----18. *Rhaphis* (p. 288).

Racemes of few or many joints, not in an open panicle.

Rachis continuous; perfect spikelets pedicellate, disarticulating at the base of the pedicel; awns plumose.

10. *Trachypogon* (p. 276).

Rachis disarticulating, the joints attached to perfect spikelets next above, forming a callus to them.

Racemes solitary, not subtended by leaflike spathes; perfect spikelets several to many above; staminate spikelets several to many below-----17. *Heteropogon* (p. 287).

Racemes several in a flabellate cluster, subtended by leaflike spathes; perfect spikelet 1 in each raceme.

19. *Themeda* (p. 288).

Fertile spikelet without a callus, the rachis disarticulating immediately below the spikelet.

Inflorescence a dense golden brown silky panicle; spikelets awnless, the pedicellate one pistillate-----5. *Eriochrysis* (p. 273).

Inflorescence not a dense golden brown silky panicle; pedicellate spikelet staminate or rudimentary.

Pedice! of the sterile spikelet thickened, appressed to the thickened rachis joint, or adnate to it.

Sessile spikelets sunken in cavities of the thickened rachis, the first glume covering the opening; sterile spikelet obscure.

8. *Manisuris* (p. 275).

Sessile spikelet not sunken in the rachis, the adnate rachis joint and pedice! sunken in the opening of the globose first glume; sterile spikelet large---9. *Rytidix* (p. 276).

Pedice! of the sterile spikelet distinct, this and the rachis joint usually slender.

Spikelets in reduced racemes of 1 to 5 (rarely 7) joints, these peduncled in open panicles; awns, if present, commonly deciduous.

Pedicellate spikelets staminate-----15. *Holcus* (p. 286).

Pedicellate spikelets wanting, the pedice! only present.

16. *Sorghastrum* (p. 286).

Spikelets in evident racemes of several to many joints.

Blades cordate, thin; pedicellate spikelets obsolete or present only in the lower part of the delicate subdigitate racemes-----11. *Arthraxon* (p. 277).

Blades linear, not cordate; pedicellate spikelets present, at least as rudiments.

Inflorescence an elongate panicle of whorled long-peduncled slender glabrous racemes; spikelets muricate, awnless-----14. *Anatherum* (p. 285).

Inflorescence not a panicle of long-peduncled racemes; spikelets not muricate; racemes commonly conspicuously woolly.

Racemes 2, forking from the summit of the slender peduncle, a staminate awnless spikelet borne in the fork-----13. *Cymbopogon* (p. 284).

Racemes 1 to many, not forking with a spikelet borne in the fork-----12. *Andropogon* (p. 277).

3. NAZIEAE.

Spikelets solitary, finally reflexed; glumes subulate, awnless.

22. *Leptothrium* (p. 289).

Spikelets 2 or more in a cluster, falling together.

Glumes smooth, connate at base, forming a pitcher-shaped false involucre.

20. *Anthephora* (p. 288).

Glumes covered with hooked spines, forming little burs, not connate.

21. *Nazia* (p. 289).

4. MELINIDEAE.

Spikelets awnless; inflorescence an attenuate panicle----24. *Triscenia* (p. 290).

Spikelets awned; inflorescence a many-flowered panicle.

Glumes awnless, the lemma with a bent or twisted awn.

23. *Arundinella* (p. 289).

Glumes awned, the awns straight; lemma awnless--25. *Achlaena* (p. 290).

5. PANICEAE.

Spikelets unisexual; plants monoecious.

Inflorescence of 2 digitate spikelike racemes, one pistillate, the other staminate-----55. *Mniochloa* (p. 360).

Inflorescence paniculate, the panicle often much reduced.

Panicles large, terminal on the culms or leafy branches, the pistillate spikelets above, the staminate below in the same panicle.

52. *Olyra* (p. 357).

Panicles all axillary or axillary and terminal, the terminal when present wholly staminate.

Fruit laterally compressed, conspicuously gibbous on the upper dorsum -----53. *Lithachne* (p. 358).

Fruit dorsally compressed, lanceolate-----54. *Raddia* (p. 358).

Spikelets perfect.

Axis thickened and corky, the spikelets sunken in cavities in its joints, these disarticulating at maturity-----51. *Stenotaphrum* (p. 356).

Axis not thickened, the spikelets not sunken in it.

Spikelets subtended or surrounded by 1 to many bristles or spines (sterile branchlets), these distinct or more or less connate at base, forming a false involucre.

Bristles persistent; spikelets deciduous-----47. *Chaetochloa* (p. 346).

Bristles falling with the spikelets at maturity.

Bristles solitary, much exceeding the appressed spikelet.

48. *Paratheria* (p. 353).

Bristles numerous below each spikelet or cluster of spikelets.

Bristles not united at base, usually slender, often plumose.

49. *Pennisetum* (p. 353).

Bristles more or less united at the base, forming a bur.

50. *Cenchrus* (p. 354).

Spikelets not subtended nor surrounded by bristles (axis of branchlet extending beyond the base of the uppermost spikelet in *Panicum*, subgenus *PAUROCHAETIUM*).

Fruit cartilaginous-indurate, not rigid, papillose, usually dark-colored, the lemma with white hyaline margins, these not inrolled.

Fruit open at the hyaline summit; inflorescence a narrow grayish-silky panicle -----26. *Leptocoryphium* (p. 291).

Fruit not open at the summit; inflorescence of digitate or flabellately panicked slender racemes.

Spikelets conspicuously long-silky; fruit lanceolate-acuminate; racemes in a flabellate panicle-----27. *Valota* (p. 291).

Spikelets with short pubescence or glabrous; fruit elliptic; racemes digitate or subdigitate-----28. *Syntherisma* (p. 292).

Fruit indurate, rigid (or if thin not hyaline-margined).

Sterile lemma splitting down the middle, the halves inrolled, appearing like two glumes side by side; raceme solitary, the rachis broad-winged -----29. *Thrasya* (p. 296).

Sterile lemma not splitting.

Spikelets solitary, sessile, placed with the back of the fruit turned away from the rachis.

Inflorescence a solitary erect spikelike raceme, the spikelets swollen on the side toward the rachis and fitting into alternate hollows-----30. *Mesosetum* (p. 297.)

Inflorescence of 2 to many racemes or paniculate.

Rachilla joint and first glume forming a swollen ringlike callus at the base of the spikelet; inflorescence paniculate.

31. *Eriochloa* (p. 298).

Rachilla joint and first glume not forming a callus at the base of the spikelet; inflorescence racemose.

Racemes racemose along the main axis; first glume present.

32. *Brachiaria* (p. 299).

Racemes aggregated at the summit of the culm; first glume wanting-----

33. *Axonopus* (p. 299).

Spikelets in 2's or 3's or solitary, placed with the back of the fruit turned toward the rachis or pedicellate in panicles.

Fruit long-acuminate, scarcely indurate, both glumes wanting; spikelet sessile, solitary, the stiff racemes horizontal or reflexed at maturity-----

34. *Reimarochloa* (p. 302).

Fruit not long-acuminate, indurate (if but slightly indurate both glumes present).

First glume typically wanting; spikelets plano-convex, subsessile in spikelike racemes-----

35. *Paspalum* (p. 302).

First glume present; spikelets usually in panicles, biconvex to globose.

Glumes or lemmas or both awned or, if short-pointed only, the summit of the fertile palea not inclosed and the spikelets crowded in short racemes.

Inflorescence of 1-sided racemes along a common axis; glumes 2-lobed (rarely entire), awned from between the lobes; fruit indurate, the palea inclosed at the summit-----

43. *Oplismenus* (p. 343).

Inflorescence paniculate.

Spikelets long-silky; first glume minute, remote.

46. *Tricholaena* (p. 346).

Spikelets not silky, often scabrous or hispid.

Spikelets with a long-pointed callus at the base.

45. *Chaetium* (p. 346).

Spikelet without a callus---44. *Echinochloa* (p. 345).

Glumes and lemmas awnless (fruit pointed in *Scutachne*).

Lower floret of the spikelet perfect, usually fruitful; spikelets small, turgid, obtuse-----

42. *Isachne* (p. 341).

Lower floret staminate or neuter.

Second glume and sterile lemma leathery-indurate; fruit mucronate -----

41. *Scutachne* (p. 341).

Second glume and sterile lemma membranaceous; fruit not mucronate.

Inflorescence a cylindric or interrupted spikelike panicle; fruit either scarcely indurate, the palea not inclosed at the summit, or stipitate and the spikelets with a saccate second glume; aquatics or sub-aquatics.

Second glume inflated-saccate; fruit stipitate.

39. *Sacciolepis* (p. 339).

Second glume not inflated-saccate; fruit scarcely indurate, open at the summit, not stipitate.

40. *Hymenachne* (p. 340).

Inflorescence an open or contracted panicle or, if somewhat spikelike, the fruit not stipitate nor the second glume saccate; fertile lemma chartaceous-indurate.

Culms woody, bamboo-like; spikelets globose, large; fertile lemma and palea bony-indurate, a downy tuft at the apex-----38. *Lasiacis* (p. 335).

Culms not woody nor bamboo-like.

Fertile lemma either with lateral appendages or excavations at the base, the margins usually not inrolled-----37. *Ichnanthus* (p. 333).

Fertile lemma with neither lateral appendages nor excavations at base, the inrolled margins clasping the palea----36. *Panicum* (p. 322).

6. ORYZEAE.

Spikelets unisexual; plants monoecious.

Pistillate lemma cylindric, beaked; glumes present; blades broad, elliptic or oblanceolate-oblong-----56. *Pharus* (p. 360).

Pistillate lemma subglobose; glumes wanting; blades narrowly linear.

57. *Luziola* (p. 361).

Spikelets perfect.

Inflorescence a terminal spike; spikelets with long coiled tendril-like awns entangled at the summit of the axis-----61. *Streptochaeta* (p. 364).

Inflorescence an open or contracted panicle; awns if present not coiled.

Glumes awned, about as long as the lemma----60. *Reynaudia* (p. 363).

Glumes awnless, much shorter than the lemma or wanting.

Glumes wanting; lemmas awnless--59. *Homalocenchrus* (p. 362).

Glumes present; lemmas usually awned-----58. *Oryza* (p. 362).

7. PHALARIDEAE.

Spikelets strongly compressed, the glumes keeled; sterile florets reduced to small scales adnate to the fertile floret-----62. *Phalaris* (p. 364).

Spikelets not compressed; sterile florets exceeding the fertile floret, awned.

63. *Anthoxanthum* (p. 364).

8. AGROSTIDEAE.

Lemmas awned.

Awn trifid (lateral awns rarely minute)-----64. *Aristida* (p. 364).

Awn simple.

Glumes awnless; panicle diffuse-----65. *Muhlenbergia* (p. 367).

Glumes awned; panicle contracted-----68. *Polypogon* (p. 370).

Lemmas awnless.

Inflorescence a cylindric spikelike panicle; glumes abruptly mucronate.

66. *Phleum* (p. 367).

Inflorescence an open or contracted panicle; glumes not abruptly mucronate.

Glumes not longer than the floret, usually much shorter.

67. *Sporobolus* (p. 367).

Glumes longer than the floret-----69. *Agrostis* (p. 371).

9. AVENEA.

Articulation below the spikelet.

Second glume narrowed above; lemma of second floret awned on the back,
the awn hooked-----70. *Notholcus* (p. 371).

Second glume broadened above; lemmas awnless.

72. *Sphenopholis* (p. 372).

Articulation above the glumes and between the florets.

Spikelets awnless -----73. *Koeleria* (p. 372).

Spikelets awned.

Awn from between the teeth of the lemma, flat, twisted below.

75. *Danthonia* (p. 372).

Awn dorsal, terete, straight or twisted.

Spikelets less than 1 cm. long, erect; panicle dense, spikelike.

71. *Trisetum* (p. 371).

Spikelets more than 1 cm. long, drooping-----74. *Avena* (p. 372).

10. CHLORIDEAE.

Plants monœcious or diœcious; pistillate spikelets many-awned; staminate
spikelets awnless; plant stoloniferous-----87. *Opizia* (p. 384).

Plants with perfect spikelets.

Spike solitary, terminating the culm.

Spikelets with 1 perfect long-awned floret-----80. *Saugetia* (p. 378).

Spikelets with several perfect short-awned florets.

82. *Tripogon* (p. 381).

Spikes 2 or more on each culm.

Spikes racemosely arranged.

Spikelets articulate below the glumes, 1-flowered; maritime grasses
with stout rhizomes-----77. *Spartina* (p. 373).

Spikelets articulate above the glumes, 2 to several-flowered (the
second floret rudimentary in *Bouteloua*).

Spikes short and relatively broad; upper floret often reduced
to the awns-----81. *Bouteloua* (p. 379).

Spikes long and slender; perfect florets 2 or more.

Lemmas awnless or with minute awns, the upper floret
reduced to an awnless small lemma.

85. *Leptochloa* (p. 382).

Lemmas with awns as long as the body, the upper floret
reduced to a slender awn----86. *Gouinia* (p. 384).

Spikes digitate or nearly so.

Spikelets with 2 or more perfect florets.

Rachis extending beyond the spikelets.

84. *Dactyloctenium* (p. 382).

Rachis not extending beyond the spikelets.

83. *Eleusine* (p. 381).

Spikelets with 1 perfect floret only.

Sterile floret wanting; lemma obtuse---76. *Capriola* (p. 373).

Sterile floret present; lemma awned or mucronate.

Fertile floret raised on a long stipe; sterile florets reduced
to long awns-----79. *Gymnopogon* (p. 377).

Fertile floret not raised on a stipe; sterile florets consist-
ing of evident lemmas-----78. *Chloris* (p. 374).

11. FESTUCEAE.

Lemmas cleft at the summit into numerous awns; panicle contracted, elongate.
88. *Pappophorum* (p. 385).

Lemmas with a single awn or awnless.

Spikelets (at least the pistillate) with copious long silky hairs on the lemmas or the rachilla; tall reeds with large plummy panicles.

Spikelets unisexual; pistillate spikelets hairy, the staminate glabrous; plants diœcious-----90. *Gynerium* (p. 385).

Spikelets perfect.

Lemmas hairy; rachilla glabrous-----91. *Arundo* (p. 386).

Lemmas glabrous; rachilla hairy-----92. *Phragmites* (p. 386).

Spikelets not long-hairy, the hairs if present much shorter than the lemma.

Glumes leaflike; spikelets concealed in the upper sheaths; plants diœcious -----89. *Monanthochloë* (p. 385).

Glumes not leaflike; spikelets exposed.

Stigmas elongate, wiry, coiled, tendril-like; spikelets in a long 1-sided raceme-----96. *Streptogyne* (p. 393).

Stigmas not elongate nor wiry.

Blades broad, ovate to elliptic, showing transverse veins between the nerves.

Spikelets 3 to 5-flowered; glumes broad, truncate; panicles small-----94. *Senites* (p. 392).

Spikelets 1 or 2-flowered, the second floret commonly obsolete, the elongate rachilla only present; glumes acuminate; panicles large, diffuse-----95. *Orthoclada* (p. 393).

Blades linear, no transverse veins showing.

Spikelets in 1-sided dense clusters, these at the ends of the few stiff panicle branches-----100. *Dactylis* (p. 394).

Spikelets not in 1-sided clusters.

Lemmas 3 nerved-----93. *Eragrostis* (p. 387).

Lemmas 5 or more nerved.

Lowest 1 to 4 lemmas empty; spikelets firm, strongly compressed.

Plants hermaphrodite, usually more than 50 cm. tall.

97. *Uniola* (p. 393).

Plants diœcious, usually less than 30 cm. tall.

98. *Distichlis* (p. 394).

Lowest lemmas fertile.

Florets horizontally spreading; lemmas cordate at base.

99. *Briza* (p. 394).

Florets ascending; lemmas not cordate.

Lemmas awnless; spikelets small.

Spikelets ovate or elliptic, few-flowered; lemmas keeled-----101. *Poa* (p. 395).

Spikelets linear, many-flowered; lemmas rounded on the back -----103. *Scleropoa* (p. 396).

Lemmas awned or mucronate (if awnless the spikelets large).

Awn from the tip-----102. *Festuca* (p. 395).

Awn from a bifid apex or wanting.

104. *Bromus* (p. 396).

12. HORDEAE.

Spikelets solitary at each node of the continuous rachis__105. *Lolium* (p. 396).
 Spikelets in 3's at each node of the articulate rachis___106. *Hordeum* (p. 396).

13. BAMBOSEAE.

Stems climbing or clambering.

Spikelets 2 to several-flowered, racemose___107. *Arthrostyidium* (p. 397).

Spikelets 1-flowered, in small panicles-----108. *Chusquea* (p. 400).

Stems erect.

Spikelets 1-flowered, in a long dense terminal panicle; culm herbaceous.

109. *Planotia* (p. 400).

Spikelets several to many-flowered, sessile in clusters, these somewhat remote on a common axis; culms woody-----110. *Bambos* (p. 401).

1. TRIPSACUM L.

Spikelets unisexual; pistillate spikelets solitary, embedded in the joints of a thickened cartilaginous articulate rachis, the indurate first glume covering the recess in the rachis, the joints readily separating at maturity; staminate spikelets in pairs at the joints of the continuous upper segment of the same rachis, this falling as a whole after anthesis. Stout perennials.

1. *Tripsacum dactyloides* (L.) L. Syst. Nat. ed. 10. 2: 1261. 1759. GAMA GRASS.
Coix dactyloides L. Sp. Pl. 972. 1753.

Tripsacum monostachyum Willd. Sp. Pl. 4: 202. 1805.

Culms sparingly branching, about 2 meters tall, in large clumps; blades flat, up to 3 cm. wide; inflorescence of 1 to 3 erect spikes.

Shady ravines and moist ground at low altitudes, central and southeastern United States, through the West Indies to South America. Originally described from America, no definite locality given.

Haiti, Santo Domingo, and Trinidad.

2. COIX L.

Spikelets unisexual; pistillate spikelets 2 or 3 together, 1 fertile and 1 or 2 rudimentary, inclosed in a bony beadlike involucre (morphologically a subtending leaf sheath); staminate spikelets approximate in 3's (the third sometimes obsolete) on a slender rachis forming a short raceme, the rachis protruding from the orifice of the involucre, these ultimate inflorescences borne on the ends of numerous branches. Broad-leaved perennials.

1. *Coix lacryma-jobi* L. Sp. Pl. 972. 1753. JOB'S TEARS.

Freely branching, 1 meter or more tall, the cordate clasping blades 2 to 3 cm. broad, the "beads" 8 to 10 mm. long.

Moist ground and waste places, especially near dwellings, throughout tropical America, cultivated as an ornamental and for the ivory or grayish beads; often escaped. Called also "Christ's tears," "camandula," and "lágrimas de Job." Originally described from the East Indies.

Common in the West Indies and to be found on probably all of the islands.

3. IMPERATA Cyrillo.

Spikelets all perfect, awnless, all pedicellate, articulate below the glumes, the rachis not disjointing, the slender racemes in a narrow spikelike panicle; glumes membranaceous, densely clothed with long silky hairs.

Panicle rarely over 10 cm. long; spikelets 4 mm. long-----1. *I. brasiliensis*.

Panicle and blades elongate; spikelets 3 mm. long-----2. *I. contracta*.

1. *Imperata brasiliensis* Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 331. 1832.

An erect tufted perennial with scaly rhizomes, the flat leaves mostly clustered toward the base, the slender simple, nearly naked culm 0.5 to 1 meter tall, with a pale silky narrow panicle.

Open rather dry ground at low altitudes, Bahamas and southern Mexico to Brazil. Originally described from Brazil. The type specimen in the Trinius Herbarium is labeled "S. da Lapa."

Bahamas (Andros, Eleuthera, and New Providence), Cuba, Jamaica (Lititz, Harris 11660), Dominica, and Trinidad.

2. *Imperata contracta* (H. B. K.) Hitchc. Rep. Mo. Bot. Gard. 4: 146. 1893.

Saccharum contractum H. B. K. Nov. Gen. & Sp. 1: 182. 1816.

Saccharum caudatum Meyer, Prim. Fl. Esseq. 68. 1818.

Anatherum caudatum Schult. Mant. 2: 445. 1824.

Anatherum portoricense Spreng. Syst. Veg. 1: 290. 1825.

Imperata caudata Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 331. 1832.

Taller than the preceding, the culms leafy, the panicle as much as 40 cm. long.

Swamps and moist open ground, southern Mexico and the West Indies to northern South America. The type of *Saccharum contractum* is from Colombia; of *S. caudatum* from British Guiana; of *Anatherum portoricense* from Porto Rico.

Cuba (Colonia San Rafael, León 5682), Jamaica, Santo Domingo, Porto Rico, Guadeloupe, Martinique, Dominica, Trinidad, and Tobago.

4. SACCHARUM L.

Spikelets all perfect, awnless, a ring of long silky spreading hairs at the base of each, one of the pair sessile; rachis articulate, the slender racemes arranged in a large panicle, the main axis and branches not disjointing.

1. *Saccharum officinarum* L. Sp. Pl. 54. 1753.

SUGAR CANE.

Saccharum violaceum Tussac, Fl. Antill. 1: 160. pl. 25. 1808.

Gigantic perennials with broad leaves, the overlapping sheaths falling from the short-jointed lower part of the culms, the great plummy panicles pinkish silvery; forming seed sparingly.

Cultivated in tropical and subtropical countries of both hemispheres. The West Indian specimens in herbaria are probably all from cultivated plants. Originally described from India. *Saccharum violaceum* was described from Jamaica. The Spanish name is "caña de azúcar."

5. ERIOCHRYSIS Beauv.

Spikelets awnless, the sessile spikelets perfect, the pedicellate spikelets pistillate, smaller but fruitful, readily falling, the rachis rather tardily disjointing; racemes short, crowded in a narrow dense silky interrupted spikelike panicle.

1. *Eriochrysis cayennensis* Beauv. Ess. Agrost. 8. pl. 4. f. 11. 1812. (Beauvois spells the name "Cayanensis.")

Saccharum cayennense Benth. Journ. Linn. Soc. Bot. 19: 66. 1881.

An erect unbranched perennial 1 to 2 meters or more tall, the long narrow blades densely velvety, the compact silky golden brown panicle 10 to 12 cm. long.

Moist slopes and savannas, southern Mexico and the West Indies to Uruguay. The type locality is presumably Cayenne, though no locality is mentioned in the original description.

Porto Rico (near San Juan and Maricao), Santo Domingo, Haiti, Martinique, and Trinidad (Arima, *Broadway* 2374).

6. *ERIANTHUS* Michx.

Spikelets all perfect, awned, silky-pubescent; rachis disjointing; racemes arranged in a large dense panicle.

1. *Erianthus saccharoides* Michx. Fl. Bor. Amer. 1: 55. 1803.

A robust tall erect unbranched perennial with long harshly pubescent blades and tawny or purplish plummy panicles up to 40 cm. long.

Swamps and moist soil from New Jersey to Florida and Texas on the Coastal Plain; also in Cuba. No definite locality is mentioned in the original description, but the range is given "a Carolina ad Floridam."

Cuba (Laguna Jovero to Laguna Herradura, *Shafer* 10934, and Laguna San Mateo, *Wright* 3903).

ERIANTHUS RAVENNAE (L.) Beauv. (*Saccharum jamaicense* Trin.,¹ *Erianthus jamaicensis* Anderss.; *E. ravennae* var. *jamaicensis* Hack.) was described by Trinius from Jamaica, but his specimen was doubtless a cultivated plant, the species being grown for ornament in warm climates.

7. *ISCHAEMUM* L.

Sessile spikelets perfect, awned; pedicellate spikelets perfect but not always fruitful; rachis disjointing; racemes 2 to several, digitate, in pairs, usually so appressed to each other as to appear like a single spike.

Racemes 2 at the apex of the culms; first glume strongly rugose across the back.

1. *I. rugosum*.

Racemes several in a cluster at the apex of the culms; first glume not rugose.

2. *I. latifolium*.

1. *Ischaemum rugosum* Salisb. Icon. Stirp. Rar. 1: pl. 1. 1791.

A branching annual, geniculate below, with bearded nodes and flat, sparsely pilose blades, the 2 erect racemes so closely appressed to each other as often to appear like a single spike.

Waste places in Cuba and Jamaica; introduced from the Old World. Originally described from India.

2. *Ischaemum latifolium* (Spreng.) Kunth, Rév. Gram. 1: 168. 1829.

Andropogon latifolius Spreng. Syst. Veg. 1: 286. 1825.

Ischaemopogon latifolius Griseb. Fl. Brit. W. Ind. 560. 1864.

Larger and stouter than the preceding, decumbent, rooting at lower nodes, the glabrous blades up to 20 cm. long and 3 cm. wide, the inflorescence fan-shaped.

Moist, shady places, southern Mexico and the Lesser Antilles to Brazil and Ecuador. Originally described from the West Indies, Guadeloupe and Martinique being mentioned.

Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, and Trinidad.

ISCHAEMUM ANGUSTIFOLIUM (Trin.) Hack. In the herbarium of the Botanical Department, Trinidad, is a specimen of this collected in 1895 by J. H. Hart, and said to be introduced. It is distinguished by its elongate narrow blades.

RHYTACHNE ROTTBOELLIODES Desv.; Hamilt. Prodr. Pl. Ind. Occ. 11. 1825. Described from a specimen purporting to be from the "Antilles" in the

¹ Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 312. 1832.

Desvaux Herbarium. The genus is an African one and the locality given is probably an error as with many other Desvaux specimens.¹

8. MANISURIS L.

Sessile spikelets perfect, awnless, sunken in hollows in the thickened articulate joints of the rachis, the flat, often rugose, indurate first glume covering the hollow; pedicellate spikelet sterile, the pedicel thickened, appressed or adnate to the rachis joint; racemes solitary.

First glume wrinkled or furrowed; plants perennial.

Plants annual, branching-----1. *M. exaltata*.

Plants perennial, simple-----4. *M. leonina*.

First glume wrinkled or furrowed; plants perennial.

First glume winged-----5. *M. aurita*.

First glume not winged.

First glume transversely wrinkled-----2. *M. loricata*.

First glume with 3 longitudinal furrows-----3. *M. impressa*.

1. *Manisuris exaltata* (L. f.) Kuntze, Rev. Gen. Pl. 2: 779. 1891. RICE GRASS.
Rottboellia exaltata L. f. Suppl. Pl. 114. 1781.

Stegosauria exaltata Nash, N. Amer. Fl. 17: 84. 1909.

A stout branching leafy annual with hispid sheaths, long flat scabrous blades, and numerous axillary racemes, the summit of these dwindling and bearing abortive spikelets only.

A weed in moist soil, in several of the West Indian islands, introduced from southern Asia. Originally described from India.

Cuba, Jamaica, Haiti, Grenada, and Trinidad.

2. *Manisuris loricata* (Trin.) Kuntze, Rev. Gen. Pl. 2: 780. 1891.

Rottboellia loricata Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 250. 1832.

Rottboellia filifolia Wright, Anal. Acad. Cienc. Habana 8: 209. 1871.

Coelorachis loricata Nash, N. Amer. Fl. 17: 85. 1909.

A slender erect unbranched tufted perennial with narrow involute blades, the solitary terminal raceme up to 25 cm. long.

Pine barren swamps, western Cuba and Brazil. Originally described from Serra da Lapa, Brazil. The type specimen of *Rottboellia filifolia* is Wright 3905, collected at Dayaniguas, Cuba.

3. *Manisuris impressa* (Griseb.) Kuntze, Rev. Gen. Pl. 2: 780. 1891.

Rottboellia impressa Griseb. Cat. Pl. Cub. 235. 1866.

Coelorachis impressa Nash, N. Amer. Fl. 17: 85. 1909.

Stouter than the preceding, 1 meter or more tall, the culm branching, bearing terminal and axillary racemes 10 to 15 cm. long.

Only known from the type collection, Wright 3904, from El Salado, Cuba.

4. *Manisuris leonina* sp. nov.

Plants perennial in small tufts from slender hard rhizomes, glabrous throughout except as noted; culms erect, 60 to 75 cm. tall, rather rigid, branching, the branches erect, the internodes flat or concave on one side; sheaths overlapping on the lower part of the culm, the upper shorter than the internodes, usually stiffly ciliate at the summit; blades narrower than the summit of the sheath, 10 to 45 cm. long, subterete, erect, the summit loosely curled; racemes 5 to 10 cm. long, terete, about 2 mm. thick, purplish, the joints 4 to 5 mm. long; fertile

¹ See Hack. in DC. Monogr. Phan. 6: 274. 1889; Hitchcock & Chase, Contr. U. S. Nat. Herb. 15: 38. 166. 1910.

spikelet closely appressed to the hollow of the rachis, 4 mm. long, nearly 2 mm. wide, sometimes two borne on a joint, the slender pedicel of the sterile spikelet lying between their inner margins; first glume acute, smooth, depressed across the base before maturity, not reticulate, pitted, nor winged; second glume nearly as long as the first, acuminate; sterile lemma hyaline, the fertile lemma and palea much reduced; pedicel of sterile floret relatively slender, the minute sterile spikelet reduced to two glumes.

Type in U. S. National Herbarium, no. 950205, collected in pine barren, San Julián, south of Guane, Province of Pinar del Río, Cuba, December 27, 1916, by Brother León (no. 6981).

In the rather frequent presence of a pair of sessile fertile spikelets at a joint, this species departs from the arrangement typical in *Manisuris*, an arrangement known in but a single anomalous species of the Philippines, *Rottboellia triflora* Hubbard, belonging to the same group. The above description is drawn from the single specimen cited. It is possible the pair of spikelets is an individual variation.

5. *Manisuris aurita* (Steud.).

Rottboellia aurita Steud. Syn. Pl. Glum. 1: 361. 1854.

Tall, like *M. impressa*, the erect branches with numerous slender racemes 6 to 10 cm. long, the first glume marginate and winged above, foveolate or pitted on the back.

Grassy hillsides, Brazil, whence originally described, to Trinidad; in the latter locality known from a specimen in the Gray Herbarium collected by Finlay.

9. *RYTILIX* Raf.

Sessile spikelet perfect, the first glume globose, indurate, alveolate, the adnate rachis joint and pedicel fitting into the opening of the glume; pedicellate spikelet relatively large, sterile.

1. *Rytlix granularis* (L.) Skeels, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 282: 20. 1913.

Cenchrus granularis L. Mant. Pl. 575. 1771.

Manisuris granularis Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Rytlix glandulosa Raf. Bull. Bot. Seringe 1: 219. 1830.

Hackelochloa granularis Kuntze, Rev. Gen. Pl. 2: 776. 1891.

A coarsely hispid, freely branching annual with flat blades and numerous terminal and axillary racemes 1 to 2.5 cm. long.

A common weed throughout tropical America, introduced from the Old World. Originally described from the East Indies. In the West Indies found on the larger islands and south to Martinique.

10. *TRACHYPOGON* Nees.

Perfect spikelet awned, pedicellate, the pedicel disjoining obliquely, forming a sharp callus below the spikelet; staminate spikelet subsessile, persistent on the slender continuous rachis; racemes solitary or few to several, digitate.

Awn 10 to 12 cm. long, conspicuously plumose-----1. *T. gouini*.
Awn mostly not over 5 cm. long, appressed-plumose on the lower part, scabrous above.

Blades involute; racemes usually solitary on the culms-----2. *T. filifolius*.

Blades flat; racemes usually 2 or 3, sometimes solitary-----3. *T. plumosus*.

1. *Trachypogon gouini* Fourn. Mex. Pl. 2: 66. 1886.

A tall slender glabrous unbranched perennial, usually geniculate below, sparingly producing scaly rhizomes; blades involute, the narrow pale feathery raceme up to 30 cm. long.

Open ground in the vicinity of Habana, Cuba, introduced from eastern Mexico. Originally described from Veracruz.

2. *Trachypogon filifolius* (Hack.) Hitchc. Contr. U. S. Nat. Herb. 12: 191. 1909.

Trachypogon polymorphus var. *filifolius* Hack. in Mart. Fl. Bras. 2³: 264. 1883.

More slender than the preceding, without rhizomes, the raceme with coarser shorter less feathery awns.

Sandy pine woods, western Cuba; also in Brazil, whence originally described.

3. *Trachypogon plumosus* (Humb. & Bonpl.) Nees, Agrost. Bras. 344. 1829.

Andropogon plumosus Humb. & Bonpl.; Willd. Sp. Pl. 4: 918. 1806.

Trachypogon polymorphus var. *plumosus* Hack. in Mart. Fl. Bras. 2³: 265. 1883.

Usually stouter than the other two, the culms sparingly branching, the blades flat, the spikes commonly 2 or 3.

Wet sandy savannas, Central America to Brazil. Originally described from Cumaná, Venezuela.

Trinidad (Piarco Savanna, *Hitchcock* 10342; St. Joseph, *Hitchcock* 10185, and Arima, *Eggers* 1379).

11. *ARTHRAxon* Beauv.

Perfect spikelets awned, sessile, the secondary spikelet and its pedicel wanting or present only at the lower joints of the filiform articulate rachis; racemes terminating the branches of a dichotomously forking panicle, in appearance subdigitate or fascicled.

1. *Arthraxon quartinianus* (A. Rich.) Nash, N. Amer. Fl. 17: 99. 1912.

Alectoridia quartiniana A. Rich. Tent. Fl. Abyss. 2: 448. 1852.

Arthraxon ciliaris subsp. *quartinianus* Hack. in DC. Monogr. Phan. 6: 356. 1889.

A weak-stemmed, laxly branching creeping annual, with ascending flowering branches, bearing flat thin ovate blades cordate at base and flabellate fascicles of slender spikes.

Shady banks, Jamaica and Guadeloupe, introduced from tropical regions of the Old World. Originally described from Abyssinia.

12. *ANDROPOGON* L.

Sessile spikelet perfect, usually awned; pedicellate spikelet staminate or neuter; rachis articulate; racemes solitary, digitate, or approximate along a continuous main axis. The species with woolly inflorescence are often called "barba de indio" in the Spanish islands. In the English islands *Andropogon bicornis* and *A. glomeratus* are called "foxtail."

Sterile or pedicellate spikelets as large as the perfect ones or larger, imbricate; racemes mostly single. (See also *A. pertusus* and *A. annulatus* with several racemes.)

Plants annual; outer glume of sterile spikelet large, bractlike, partly concealing the perfect spikelets.....1. *A. fastigiatus*.

Plants perennial; sterile spikelets not much larger than fertile ones, not concealing them.

Peduncle glabrous below the raceme.....10. *A. caricosus*.

Peduncle pubescent below the raceme.....11. *A. nodosus*.

Sterile or pedicellate spikelets much smaller than the fertile ones, often rudimentary (about as large in *A. pertusus* and *A. annulatus* with several racemes).

Racemes solitary at the ends of the culms or branches, from bractlike sheaths; rachis joints clavate, the apex with a cuplike hollow. (Subgenus SCHIZACHYRIUM.)

Plants annual.

Culms weak, decumbent; blades obtuse, 2 to 4 cm. long; peduncles capillary, spreading ----- 2. *A. brevifolius*.

Culms erect; blades acute, usually 5 to 10 cm. long; peduncles slender, but not capillary ----- 3. *A. malacostachyus*.

Plants perennial.

Rachis conspicuously flexuous, very slender, the spikelets spreading.

Blades flat; racemes very numerous in a corymbose panicle; plants robust ----- 4. *A. condensatus*.

Blades involute; racemes few; plants slender.

Racemes densely white-villous with long hairs; blades firm. ----- 6. *A. gracilis*.

Racemes sparsely villous; blades rather soft.

----- 7. *A. cubensis*.

Rachis straight, the spikelets appressed or narrowly ascending.

Spikelets awnless.

Racemes 1 to 2 cm. long, partly inclosed in the subtending spathe, numerous, aggregated in a narrow panicle. ----- 8. *A. virgatus*.

Racemes 4 to 8 cm. long, few, exserted ----- 9. *A. salzmanni*.

Spikelets awned.

First glume of the sessile spikelet villous.

----- 12. *A. hirtiflorus*.

First glume of the sessile spikelet glabrous or nearly so.

Blades terete-filiform; sessile spikelet 1.5 mm. broad.

----- 5. *A. multinervosus*.

Blades flat or folded or sometimes involute toward the apex.

Sessile spikelet about 4 mm. long, 1 mm. wide; blades not over 1.5 mm. wide.

----- 13. *A. tener*.

Sessile spikelet about 5 mm. long; blades 2 to 5 mm. wide ----- 14. *A. semiberbis*.

Racemes 2 or more together at the ends of the culms or branches.

Plants annual; racemes several on capillary flexuous peduncles.

----- 15. *A. piptatherus*.

Plants perennial; peduncles not capillary nor flexuous.

Racemes numerous or several arranged along an axis, forming a panicle.

Pedicellate spikelet much smaller than the fertile one, the latter not pitted ----- 18. *A. saccharoides*.

Pedicellate spikelet about as large as the fertile one.

First glume with a pinhole-like pit on the back.

----- 16. *A. pertusus*.

First glume not pitted ----- 17. *A. annulatus*.

Racemes 2 to 4 (sometimes more in *A. selloanus*), fascicled, subtended by a bladeless sheath (spathe), exserted or partly included in it.

Spikelets awnless.

Plants robust, 1.25 to 2 meters tall; spathes aggregated in a corymbose, usually dense inflorescence.

19. *A. bicornis*.

Plants slender, usually less than 1 meter tall; spathes not aggregated.

Sessile spikelets about 3 mm. long; blades usually not over 2 mm. wide, the apex acuminate.

20. *A. leucostachyus*.

Sessile spikelets about 4 mm. long; blades 3 to 5 mm. wide, the apex boat-shaped---21. *A. selloanus*.

Spikelets awned.

Pairs of racemes few, terminal on the culms or the few simple branches, the common peduncle long-exserted.

22. *A. nashianus*.

Pairs of racemes several to many, subtended by well-developed spathes.

Blades involute; axis of raceme slender but straight.

23. *A. urbanianus*.

Blades flat; axis of racemes delicate and flexuous.

Racemes aggregated in a dense club-shaped or corymbose inflorescence, the ultimate spathes not over 2 mm. wide, rarely equaling their racemes-----25. *A. glomeratus*.

Racemes not aggregated, the ultimate spathes 3 to 5 mm. wide, much exceeding their racemes.

24. *A. virginicus*.

1. *Andropogon fastigiatus* Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Diectomis fastigiata H. B. K. Nov. Gen. & Sp. 1: 193. 1816.

Sorghum fastigiatum Kuntze, Rev. Gen. Pl. 2: 791. 1891.

A slender erect glabrous annual with flat linear blades and firm ligules up to 2 cm. long; culms freely branching above, the racemes broad, with conspicuous sterile spikelets and geniculate awns about 4 cm. long.

Dry open ground, southern Mexico and the West Indies to Brazil. Originally described from Jamaica.

Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, and Grenada.

2. *Andropogon brevifolius* Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Andropogon obtusifolius Poir. in Lam. Encycl. Suppl. 1: 583. 1810.

Pollinia brevifolia Spreng. Pl. Pugill. 2: 13. 1815.

Schizachyrium brevifolium Nees; Kunth, Enum. Pl. 1: 488. 1833.

Sorghum brevifolium Kuntze, Rev. Gen. Pl. 2: 791. 1891.

A slender trailing or reclining glabrous branching annual, with flat obtuse spreading blades and delicate racemes with small spikelets and awns about 8 mm. long.

Moist banks, tropical regions of both hemispheres. Originally described from Jamaica; *A. obtusifolius* described from Porto Rico. To be found in probably all of the West Indian islands from Cuba to Trinidad. Not represented in collections from the Bermudas and the Bahamas.

3. *Andropogon malacostachyus* Presl, Rel. Haenk. 1: 337. 1830.

Schizachyrium malacostachyum Nash, N. Amer. Fl. 17: 102. 1912.

A slender erect glabrous branching annual up to 50 cm. high, the flat linear acute blades ascending, the numerous racemes erect, more or less fascicled, the geniculate awns about 12 mm. long.

Dry hills, southern Mexico and Central America; also Cuba, in the vicinity of Habana.

4. *Andropogon condensatus* H. B. K. Nov. Gen. & Sp. 1: 188. 1816.

Andropogon microstachyus Desv.; Hamilt. Prodr. Pl. Ind. Occ. 8. 1825.

Schizachyrium condensatum Nees, Agrost. Bras. 333. 1829.

Pollinia microstachya Desv. Opusc. 70. 1831.

A tall robust tufted glabrous perennial with compressed culms, repeatedly branching toward the summit, forming a large corymbose mass of racemes with very flexuous rachises and delicate awns about 12 mm. long.

Open, rather dry ground, eastern Mexico and the southern West Indies to Argentina. Originally described from Colombia; *A. microstachyus* described from the Antilles.

Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, Grenada, Trinidad, and Tobago.

5. *Andropogon multinervosus* (Nash).

Schizachyrium multinervosum Nash, N. Amer. Fl. 17: 109. 1912.

A wiry, sparingly branching perennial with filiform blades and few racemes with delicate awns.

Palm barrens, Madruga and Camaguey, Cuba, the type specimen from Madruga, Britton & Shafer 608.

6. *Andropogon gracilis* Spreng. Syst. Veg. 1: 284. 1825.

Andropogon juncifolius Desv.; Hamilt. Prodr. Pl. Ind. Occ. 9. 1825.¹

Sorghum gracile Kuntze, Rev. Gen. Pl. 2: 791. 1891.

Schizachyrium gracile Nash in Small, Fl. Southeast. U. S. 60. 1903.

A densely tufted slender erect wiry glabrous perennial with filiform blades and delicate pale feathery racemes 2 to 5 cm. long, the delicate awns 1 to 1.5 cm. long.

Rocky hills and banks, southern Florida and the West Indies. Originally described from Hispaniola. The type of *A. juncifolius* is from Santa Cruz [St. Croix]. Described as *A. scoparius* by Richard.²

Bahamas, Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, and Guadeloupe.

7. *Andropogon cubensis* Hack. Flora 68: 121. 1885.

Sorghum cubense Kuntze, Rev. Gen. Pl. 2: 791. 1891.

Schizachyrium cubense Nash, N. Amer. Fl. 17: 109. 1912.

Similar to the preceding; culms taller, the racemes but sparsely silky, the awns less than 1 cm. long.

Known only from the type collection from an unrecorded locality in Cuba (Wright 3898), and from a collection from the Isle of Pines (Britton & Wilson 14291).

8. *Andropogon virgatus* Desv.; Hamilt. Prodr. Pl. Ind. Occ. 9. 1825.

Hypogynium spathiflorum Nees, Agrost. Bras. 366. 1829.

Anatherum virgatum Desv. Opusc. 71. 1831.

Andropogon spathiflorus Kunth, Enum. Pl. 1: 496. 1833.

Andropogon inermis Steud. Syn. Pl. Glum. 1: 390. 1854.

Anatherum spathiflorum Griseb. Cat. Pl. Cub. 236. 1866.

Anatherum inerme Griseb. Cat. Pl. Cub. 236. 1866.

A tall glabrous tufted perennial with compressed rigid culms, long linear blades, and elongate panicles of small glabrous racemes partly inclosed in rufous or purplish spathes.

¹ It is uncertain which of these names is the earlier.

² In Sagra, Hist. Cuba 11: 320. 1850.

Wet sandy open swamps or savannas, West Indies and Central America to Brazil. Originally described from the "Antilles." The type of *Hypogynium spathiflorum* is from Brazil and that of *Anatherum inerme* from Colombia.

Cuba, Santo Domingo, Porto Rico, and Trinidad.

9. *Andropogon salzmanni* (Trin.) Nash, N. Amer. Fl. 17: 104. 1912.

Rottboellia salzmanni Trin.; Steud. Syn. Pl. Glum. 1: 361. 1854.

Andropogon imberbis var. *muticus* Hack. in DC. Monogr. Phan. 6: 380. 1889.

A glabrous, sparingly branched, ascending perennial with compressed culms, long linear flexuous or curled blades, and yellow, nearly glabrous racemes of appressed awnless spikelets.

Sandy hills, southern Mexico to Brazil; also in a few West Indian islands. Originally described from Brazil.

Guadeloupe, Dominica, and Martinique.

10. *Andropogon caricosus* L. Sp. Pl. ed. 2. 1840. 1763.

Andropogon annulatus var. *subrepens* Hack. Notizbl. Bot. Gart. Berlin 1: 327. 1897.

A decumbent, freely branched low perennial with flat blades 2 to 8 cm. long and solitary or paired racemes, the sterile spikelets as conspicuous as the fertile ones, giving the appearance of a flat 2-ranked scaly spike; awns slender, twisted, and bent.

Waste places; introduced in a few places in the West Indies from southern Asia. Originally described from India. *Andropogon annulatus* var. *subrepens* was described from Guadeloupe, Duss 3678 being the type.

Cuba (Province of Habana) and Guadeloupe.

11. *Andropogon nodosus* (Willem.) Nash, N. Amer. Fl. 17: 122. 1912.

Dichanthium nodosum Willem. Ann. Bot. Usteri 18: 11. 1796.

Similar to the preceding, somewhat larger, blades and racemes longer.

Waste places; introduced in a few places in the West Indies from the Tropics of the Old World. Originally described from Mauritius. Probably only a variety of *A. caricosus*.

Antigua, Guadeloupe, and Barbados.

12. *Andropogon hirtiflorus* (Nees) Kunth, Rév. Gram. 2: 569. 1832.

Streptachne domingensis Spreng.; Schult. Mant. 2: 188. 1824.

Schizachyrium hirtiflorus Nees, Agrost. Bras. 334. 1829.

Aristida? domingensis Kunth, Rév. Gram. 1: 62. 1829.

Andropogon oligostachyus Chapm. Fl. South. U. S. 581. 1860.

Andropogon semiberbis var. *incertus* Hack. in DC. Monogr. Phan. 6: 370. 1889.

Schizachyrium domingense Nash, N. Amer. Fl. 17: 103. 1912.

Andropogon domingensis Hubbard, Proc. Amer. Acad. 49: 493. 1913, not Steud. 1821.

A tall slender erect tufted flat-stemmed perennial, with long narrow flat blades and erect short-pilose racemes, the twisted awns about 1 cm. long.

Rocky or gravelly hills or flats, Florida, through the West Indies to Paraguay. Originally described from Brazil. The type of *Streptachne domingensis* is from Santo Domingo; of *Andropogon oligostachyus* from middle Florida, and of *A. semiberbis* var. *incertus* from eastern Cuba (Wright 1558).

Cuba, Jamaica (southern Manchester), Haiti (Marmalade), and Porto Rico (Maricao).

13. *Andropogon tener* (Nees) Kunth, Rév. Gram. 2: 565. 1832.

Schizachyrium tenerum Nees, Agrost. Bras. 336. 1829.

Similar to the preceding, densely tufted, more slender, the blades narrower, more or less involute, the numerous slender racemes rarely 5 cm. long.

Grassy hills and rocky cliffs, southern United States to Argentina. Originally described from Brazil.

Cuba (Province of Pinar del Río) and Jamaica (in the Blue Mountains).

14. *Andropogon semiberbis* (Nees) Kunth, Enum. Pl. 1: 496. 1833.

Schizachyrium semiberbe Nees, Agrost. Bras. 336. 1829.

Similar to no. 12, stouter, taller, often glaucous; blades up to 5 mm. wide; racemes numerous toward the summit of the culm.

Grassy hills and savannas, Florida, through the West Indies to Brazil. Originally described from Brazil.

Bahamas (New Providence), Cuba, Haiti, Santo Domingo, Porto Rico, and Trinidad (St. Joseph, *Hitchcock* 10194).

15. *Andropogon piptatherus* Hack. in Mart. Fl. Bras. 2^a: 293. 1883.

Amphilophis piptatherus Nash, N. Amer. Fl. 17: 127. 1912.

A weak-stemmed branching annual with flat scabrous blades and loose fascicles of racemes with twisted bent awns about 3 cm. long.

Moist rocky cliffs and shady banks, Mexico to Brazil; also in Jamaica and Santo Domingo. Originally described from Brazil.

16. *Andropogon pertusus* (L.) Willd. Sp. Pl. 4: 922. 1806. SEYMOUR GRASS.

Holcus pertusus L. Mant. Pl. 2: 301. 1771.

An ascending branching tufted perennial with bearded nodes, pubescent blades, and somewhat fan-shaped panicles of several to many villous racemes with twisted bent awns about 2.5 cm. long.

Roadsides and open grassy places, tropics of the Old World; introduced in the West Indies. Originally described from India. This species is described by Nash¹ as *Amphilophis ischaemum* (L.) Nash (*Andropogon ischaemum* L.), an Old World species with glumes not pitted. It may be that *A. pertusus* is only a form of *A. ischaemum* with pitted glumes.

Jamaica, Antigua, Guadeloupe, Dominica, Martinique, Grenada, and Barbados.

- 16a. *Andropogon pertusus* var. *panormitanus* (Parl.) Hack. in DC. Monogr. Phan. 6: 481. 1889.

Andropogon panormitanus Parl. "In Diar. Congr. Venezia 1847"; Fl. Ital. 1: 140. 1848.

Differs from the species in having glabrous nodes and nearly glabrous blades.

Roadsides and open grassy places, warmer parts of the Old World. Introduced in the West Indies. Called "sour-grass" in Tobago. Originally described from Sicily. This appears to be what was described by Richard² as *Andropogon ischaemum*.

St. Croix, Antigua, St. Vincent, Barbados, Trinidad, and Tobago.

17. *Andropogon annulatus* Forsk. Fl. Aegypt. Arab. 173. 1775.

Resembling *A. pertusus* but differing in the absence of the pit on the back of the glumes and in the more imbricate spikelets; nodes bearded.

A native of the Old World, originally described from Egypt. Introduced in Cuba.

18. *Andropogon saccharoides* Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Andropogon saccharoides subsp. *leucopogon* subvar. *paucirameus* Hack. in DC. Monogr. Phan. 6: 497. 1889.

Sorghum saccharoides Kuntze, Rev. Gen. Pl. 2: 792. 1891.

¹ N. Amer. Fl. 17: 124. 1912.

² In Sagra, Hist. Cuba 11: 320. 1850.

Holcus saccharoides Kuntze in Stuckert, Anal. Mus. Nac. Buenos Aires 11: 48. 1904.

Amphilophis saccharoides Nash, N. Amer. Fl. 17: 125. 1912.

Andropogon saccharoides var. *surius* Krause, Beiheft Bot. Centralbl. 32: 334. 1914.

A tall erect unbranched perennial with brittle culms, rather firm long flat blades, and an oblong pale silky panicle of numerous racemes, the delicate awns 1.5 to 2 cm. long.

Rocky hills and grassy slopes, southwestern United States to northern South America and the West Indies.

Originally described from Jamaica. The subvariety *paucirameus* was described from Cuba (*Wright* 1556 being the type) and the variety *surius* from Barbados (*Wiegand* 2085). The Cuban specimens were referred by Hitchcock¹ to *A. leucopogon* Nees. This is one of the grasses called "rabo de zorra" in Cuba.

Cuba, Jamaica, Haiti, Santo Domingo, western Porto Rico, Antigua, and Martinique.

19. *Andropogon bicornis* L. Sp. Pl. 1046. 1753.

Anatherum bicornne Beauv. Ess. Agrost. 128. 1812.

Saccharum bicornne Griseb. Abh. Ges. Wiss. Göttingen 7: 266. 1857.

Sorghum bicornne Kuntze, Rev. Gen. Pl. 2: 791. 1891.

A tall robust tufted perennial with long linear blades, scabrous on the margin, and large feathery corymbose inflorescence of delicate racemes, one, sometimes two, of the uppermost pediceled spikelets larger than the fertile ones, the other pediceled spikelets rudimentary. Has much the habit of *A. condensatus*, distinguished from that by the awnless spikelets and paired racemes.

Grassy hills and banks, southern Mexico to Brazil and widely distributed in the West Indies. The type specimen is probably from Jamaica, though the localities mentioned with the original description are: "Brasilia, Jamaica." Sometimes called "ridging grass."

Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, St. Thomas, St. Jan, Tortola, St. Kitts, Antigua, Montserrat, Dominica, Martinique, St. Vincent, Grenada, Trinidad, and Tobago.

20. *Andropogon leucostachyus* H. B. K. Nov. Gen. & Sp. 1: 187. 1816.

Anatherum domingense Roem. & Schult. Syst. Veg. 2: 809. 1817.

Andropogon domingensis Steud. Nom. Bot. 45. 1821.

Sorghum leucostachyum Kuntze, Rev. Gen. Pl. 2: 792. 1891.

A slender, densely tufted erect perennial, the elongate blades with a deeply impressed midvein; racemes 2 or 3 on slender exserted peduncles, the spikelets obscured by the copious long silky hairs. Foliage villous in some of the Trinidad specimens, the subvar. *subvillosus* Hack.

Cliffs and grassy slopes, West Indies and southern Mexico to Brazil. Originally described from Venezuela. The type of *Anatherum domingense* collected in "Domingo" by Poiteau.

Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, St. Thomas, and Trinidad.

21. *Andropogon selloanus* (Hack.) Hack. Bull. Herb. Boiss. II. 4: 266. 1904.

Andropogon leucostachyus var. *selloanus* Hack. in DC. Monogr. Phan. 6: 420. 1889.

Similar to the preceding, stouter, the blades shorter, broader, and with a boat-shaped tip; racemes often 5 or 6.

¹ Contr. U. S. Nat. Herb. 12: 193. 1909.

Savannas and open ground, West Indies to Paraguay. The type specimen collected in Brazil by Sello.

Cuba (Pinar del Río and Isle of Pines), Trinidad (Pitch Lake and St. Joseph), and Tobago.

22. *Andropogon nashianus* Hitchc. Contr. U. S. Nat. Herb. 12: 193. 1909.

A slender erect perennial with narrow folded blades and terminal, densely silky racemes on long naked peduncles.

Sandy barrens, western Cuba and Antigua, the type specimen collected by Wright (no. 3899) in Pinar del Río, Cuba.

23. *Andropogon urbanianus* Hitchc. Bot. Gaz. 54: 424. 1912.

Taller than the preceding with long involute blades and grayish tawny racemes with dark spathes loosely scattered along the upper third of the culm, the pedicellate spikelets nearly as long as the fertile ones.

Dry hills, Hispaniola, the type specimen being *Fuertes* 1420.

Haiti (Camache, *Buch* 961, 1074) and Santo Domingo (Salinas, *Fuertes* 1420).

24. *Andropogon virginicus* L. Sp. Pl. 1046. 1753.

Densely tufted, with a mass of long leaves at the base, the compressed culms 1 to 1.5 meters high, with delicate feathery racemes scattered along the upper half or third.

Sterile hills and open woods, eastern United States to the West Indies and eastern Mexico. Originally described from Virginia.

Bermuda (*Brown & Britton* 225), Bahamas (New Providence), Cuba, and Jamaica.

25. *Andropogon glomeratus* (Walt.) B. S. P. Prel. Cat. N. Y. 67. 1888.

Cinna glomerata Walt. Fl. Carol. 59. 1788.

Andropogon macrourus Michx. Fl. Bor. Amer. 1: 56. 1803.

Andropogon densus Desv.; Hamilt. Prodr. Pl. Ind. Occ. 8. 1825.

Anatherum macrourum Griseb. Mem. Amer. Acad. n. ser. 8: 534. 1862.

Andropogon tenuispathus Nash, N. Amer. Fl. 17: 113. 1912.

A rather robust, densely tufted, erect perennial with compressed culms, crowded keeled lower sheaths, and a feathery club-shaped, usually dense inflorescence. Loose-panicled specimens may be distinguished from *A. virginicus* by the smaller spathes rarely overtopping the racemes.

Moist or dry open ground, southeastern United States through Mexico and the West Indies to northern South America. Originally described from South Carolina. The type of *Andropogon macrourus* is from Virginia or Carolina; of *Andropogon densus* from the "Antilles"; of *Andropogon tenuispathus* from Florida.

Bahamas (New Providence, Andros, and Eleuthera), Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, St. Kitts, Antigua, Guadeloupe, and Martinique.

13. CYMBOPOGON Spreng.

Racemes 2, on slender peduncles, subtended by a spathe-like sheath (the spathe narrow and often remote in *C. hirtus*), a staminate awnless spikelet borne at the summit of the peduncle in the fork of the two racemes, one or both of the racemes sometimes again forking at the lower joints with a staminate spikelet in the fork, one of the secondary racemes reduced to a single joint.

1. *Cymbopogon hirtus* (L.) Nees; Baker, Fl. Maurit. 446. 1877, as synonym of *Andropogon hirtus* L. Sp. Pl. 1046. 1753.

A slender ascending perennial with geniculate lower nodes, narrow scabrous blades, and few to several pairs of racemes about 5 cm. long, these densely short-villous, the twice-bent awns about 3 cm. long.

Waste places, introduced in a few localities in Mexico and the West Indies. Native of the Mediterranean region, whence originally described.

Cuba (Habana, *León* 2788; Manacas, *León* 5841, 5870), and Santo Domingo (*Wright, Parry & Brummel* 616).

The citronella grass (*Cymbopogon nardus* (L.) Rendle, *Andropogon nardus* L.) and the lemon grass (*Cymbopogon citratus* (DC.) Stapf) are cultivated and may possibly be found growing spontaneously. They are robust aromatic grasses with large compound inflorescences of small awnless or obscurely awned racemes, the first species with the glumes of the sessile spikelets flat on the back, the second with these glumes concave on the back. The essential oils of these and related species are used in perfumery.¹ Lemon grass is called "hierba de limón" in Cuba. In Porto Rico the fibrous rootstock of *C. nardus* is used as a toothbrush by the poorer people.

14. ANATHERUM Beauv.

Racemes long, slender, solitary, on long filiform peduncles borne in whorls on an elongate axis, forming a large panicle; spikelets awnless, arranged as in *Andropogon*, the filiform rachis tardily disjoining.

1. *Anatherum zizanioides* (L.).

KHUS-KHUS.

Phalaris zizanioides L. Mant. Pl. 183. 1771.

Andropogon squarrosus L. f. Suppl. Pl. 443. 1781.

Andropogon muricatus Retz. Obs. Bot. 3: 43. 1783.

Anatherum muricatum Beauv. Ess. Agrost. 128, 150. pl. 22. f. 10. 1812.

Vetiveria arundinacea Griseb. Fl. Brit. W. Ind. 559. 1864.

Vetiveria muricata Griseb. Fl. Brit. W. Ind. 560. 1864.

Sorghum zizanioides Kuntze, Rev. Gen. Pl. 2: 791. 1891.

Andropogon zizanioides Urban, Symb. Antill. 4: 79. 1903.

Vetiveria zizanioides Nash in Small, Fl. Southeast. U. S. 67. 1903.

A robust, densely tufted, erect, branching perennial with scabrous-margined blades, elongate-pyramidal panicles, and muricate spikelets.

Commonly cultivated in the West Indies as a hedge plant and for its aromatic roots. Sometimes escaped along roadsides. Originally described from India. *Andropogon squarrosus* and *Andropogon muricatus* are also described from India. *Vetiveria arundinacea* is described from the West Indies, Jamaica and Trinidad being mentioned, as "perhaps introduced from the East Indies." This is called "vetiver"² in Cuba. The roots are packed with articles of clothing to preserve them from moths. This is the grass that produces the aromatic roots called in Porto Rico "pacholi"³ or "pachuli." The Indian name "khus-khus" is used in the English islands. The aromatic roots are sometimes woven into screens which, when wet, are used to perfume living quarters. Also sometimes called "cockroach grass" and "khas-khas."

¹ A detailed account of these grasses is given by Stapf in an article on The Oil-grasses of India and Ceylon (Kew Bull. Misc. Inf. 1906: 297-363. 1906).

² Maza and Roig, Est. Exp. Agron. Bol. 22: 108. 1914.

³ Cook, O. F., and Collins, G. N. Economic Plants of Porto Rico. Contr. U. S. Nat. Herb. 8: 208. 1903.

15. *HOLCUS* L.

Racemes reduced to 1 to 5 joints, borne on slender peduncles on the slender branches of a compound panicle; rachis slender, tardily disjoining; spikelets arranged as in *Andropogon*, the pedicellate spikelet usually staminate, the sessile spikelets awnless or with a deciduous awn.

Plants perennial, with creeping rhizomes-----1. *H. halepensis*.
Plants annual -----2. *H. sorghum*.

1. *Holcus halepensis* L. Sp. Pl. 1047. 1753.

JOHNSON GRASS.

Andropogon halepensis Brot. Fl. Lusit. 1: 89. 1804.

Sorghum halepensis Pers. Syn. Pl. 1: 101. 1805.

A robust perennial with numerous stout rhizomes, flat scabrous-margined blades, and a large open panicle of plump spikelets with deciduous awns.

A weed in fields and waste places in the warmer parts of America; introduced from the Old World. Originally described from Syria. Found in all the large islands and probably in most of the smaller ones.

This species is described by Humboldt, Bonpland, and Kunth,¹ with Habana, Cuba, given as locality, under the name "*Andropogon avenaceus* Schrad." This is evidently a misprint for *A. arundinaceus* Willd., as described by Schrader.² In Cuba this is called "cañuela" and "hierba de Don Carlos."

2. *Holcus sorghum* L. Sp. Pl. 1047. 1753.

SORGHUM or SORGO.

Andropogon sorghum Brot. Fl. Lusit. 1: 88. 1804.

Sorghum vulgare Pers. Syn. Pl. 1: 101. 1805.

Sorghum dora Griseb. Fl. Brit. W. Ind. 560. 1864.

A large broad-leaved annual, with a compact panicle of turgid persistent spikelets.

Occasionally cultivated in the West Indies and sometimes spontaneous in waste places or near fields. Widely cultivated in other parts of America and in the Old World, whence originally described. In the English islands it is often called "Guinea corn"; in Cuba it is called "millo."

2a. *Holcus sorghum sudanensis* (Piper) Hitchc. Proc. Biol. Soc. Washington 29: 128. 1916.

SUDAN GRASS.

Andropogon sorghum sudanensis Piper, Proc. Biol. Soc. Washington 28: 33. 1915.

Resembling no. 1, but less robust and having no rhizomes.

Coming into cultivation in the West Indies in recent years and sparingly escaped. Described from a cultivated specimen grown from seed from the Sudan.

Santo Domingo, Porto Rico, and St. Vincent.

16. *SORGHASTRUM* Nash.

Racemes arranged as in *Holcus*, the pedicellate spikelet wanting, the pedicel only present; rachis flexuous, readily disjoining.

Awn straight or slightly bent, not strongly spirally twisted at base, shorter than the spikelet or sometimes a little longer-----1. *S. parviflorum*.

Awn geniculate, strongly spirally twisted at base, about 3 times as long as the spikelet-----2. *S. stipoides*.

¹ Nov. Gen. & Sp. 1: 189. 1816.² Fl. Germ. 1: 237. 1806.

1. *Sorghastrum parviflorum* (Desv.).

Sorghum parviflorum Desv.; Hamilt. Prodr. Pl. Ind. Occ. 12. 1825.

Andropogon setosus Griseb. Cat. Pl. Cub. 235. 1866.

Andropogon agrostoides Speg. Anal. Soc. Cienc. Argentina 16: 136. 1883.

Andropogon francavillanus Fourn. Mex. Pl. 2: 56. 1886.

Sorghastrum francavillanum Hitchc. Contr. U. S. Nat. Herb. 12: 195. 1909.

Sorghastrum setosum Hitchc. Contr. U. S. Nat. Herb. 12: 195. 1909.

Sorghastrum agrostoides Hitchc. Bot. Gaz. 51: 300. 1911.

A tall erect tufted glabrous perennial with long, flat or subinvolute blades and long lanceolate panicles with slender or subcapillary branchlets and peduncles and golden brown spikelets, the ultimate peduncles, the sterile pedicels, and the base of the spikelet clothed with white hairs; awn variable in length.

Grassy hillsides, southern Mexico and the West Indies to Argentina. Originally described from Hispaniola. The type of *Andropogon setosum* is from Cuba. Grisebach cites *Piptatherum setosum* A. Rich., "ex descr.," but Richard's description does not well apply to this species. It is probably wiser to consider *Andropogon setosum* as a new species rather than as a change of name and to take Grisebach's specimen, Wright 3897, as the type. *Andropogon agrostoides* was described from Argentina and *Andropogon francavillanus* from Mexico.

Central Cuba, Jamaica, Haiti, Santo Domingo, and Porto Rico (vicinity of San Juan).

2. *Sorghastrum stipoides* (H. B. K.) Nash, N. Amer. Fl. 17: 129. 1912.

Andropogon stipoides H. B. K. Nov. Gen. & Sp. 1: 189. 1816.

Andropogon domingensis Spreng.; Steud. Nom. Bot. ed. 2. 1: 91. 1840, as synonym of *A. stipoides*.

More slender than the preceding, the narrower blades convolute, the spikelets slightly larger, and the awns well developed.

Palm barrens, eastern Cuba (Guane, Shafer 10353) and Colombia to Brazil. Originally described from Colombia. This is the species referred by Hitchcock¹ to *S. francavillanum*.

17. *HETEROPOGON* Pers.

Racemes solitary, the lower part of the rachis not disjuncting, bearing 2 to 5 pairs of staminate awnless spikelets, the upper part of the rachis disarticulating obliquely at the base of each joint, each forming a sharp callus below the long-awned sessile perfect spikelet, the pedicellate spikelet staminate.

1. *Heteropogon contortus* (L.) Beauv.; Roem. & Schult. Syst. Veg. 2: 836. 1817.

Andropogon contortus L. Sp. Pl. 1045. 1753.

Andropogon secundus Willd.; Nees, Agrost. Bras. 364. 1829.

A tall branching annual with compressed culms, keeled sheaths, scabrous blades, and solitary racemes of imbricate spikelets, the lower awnless, the upper with long brown bent awns. Lemon-scented when fresh.

Rocky slopes, warmer parts of both hemispheres. Originally described from India.

Cuba, Jamaica, Haiti, Santo Domingo, Antigua, and Guadeloupe.

¹ Contr. U. S. Nat. Herb. 12: 195. 1909.

18. RHAPHIS Lour.¹

Inflorescence a few-flowered panicle, the racemes reduced to a single joint of the rachis with a sessile perfect spikelet and 2 pedicellate sterile spikelets (the latter sometimes obsolete) borne at the ends of slender naked peduncles, these disjoining obliquely near the summit, forming a sharp callus below the long-awned spikelets.

1. *Rhaphis pauciflora* (Chapm.) Nash in Small, Fl. Southeast. U. S. 67. 1903.
Andropogon wrightii Munro; Wright in Sauv. Fl. Cub. 202. 1873, nom. nud.
Sorghum pauciflorum Chapm. Bot. Gaz. 3: 20. 1878.
Chrysopogon pauciflorus Benth.; Vasey, Grasses U. S. 20. 1883.

A slender branching annual with flat or folded ciliate blades and a few-flowered panicle with capillary branchlets, the brown spikelets raised on a hairy callus of nearly equal length, the twisted bent awns up to 15 cm. long.

Sandy pine barrens, Florida and eastern Cuba, the type locality of *S. pauciflorum* being Jacksonville, Florida, and of *A. wrightii* being Cuba.

19. THEMEDA Forsk.

Inflorescence a flabellate cluster of several racemes, each subtended by a leaflike spathe, the entire cluster (or panicle) subtended or partly inclosed by a larger spathe; racemes consisting of 2 approximate pairs of sessile awnless staminate or neuter spikelets and a single fertile awned spikelet with a pair of sterile pedicellate ones, the rachis disjoining above the pairs of sessile staminate spikelets and forming a pointed callus below the fertile one.

Sessile spikelets villous; glumes not strongly papillose-----1. *T. arguens*.
 Sessile spikelets not villous; glumes strongly papillose, the papillæ bearing long stiff hairs-----2. *T. quadrivalvis*.

1. *Themeda arguens* (L.) Hack. in DC. Monogr. Phan. 6: 657. 1889.

CHRISTMAS GRASS.

Stipa arguens L. Sp. Pl. ed. 2. 117. 1762.

An ascending annual with compressed branching culms, flat scabrous blades, and V-shaped clusters of long-awned spikelets.

Introduced in Jamaica (Morant Bay and Troy); native of Asia. Originally described from India.

2. *Themeda quadrivalvis* (L.) Kuntze, Rev. Gen. Pl. 2: 794. 1891.

KANGAROO GRASS.

Andropogon quadrivalvis L. Syst. Veg. ed. 13. 758. 1774.

Anthistiria ciliata L. f. Suppl. 113. 1781.

Themeda ciliata Hack. in DC. Monogr. Phan. 6: 664. 1889.

Usually taller than the preceding with an elongate inflorescence of more numerous and smaller clusters of spikelets. Exceedingly variable in the size of the subtending spathes.

Introduced in Martinique and Barbados; native of the East Indies. Originally described from India.

20. ANTHEPHORA Schreb.

Spikelets in clusters of 4, the indurate first glumes united at base, forming a pitcher-shaped pseudo-involucre, the clusters subsessile and erect on a slender flexuous continuous axis.

¹ The name *Rhaphis* L. f.; Ait. Hort. Kew. 3: 473. 1789, having a different derivation and pronounciation should not invalidate *Rhaphis* Lour. The latter name should replace *Chrysopogon* Trin. Fund. Agrost. 187. 1820.

1. *Antheophora hermaphrodita* (L.) Kuntze, Rev. Gen. Pl. 2: 759. 1891.
Tripsacum hermaphroditum L. Syst. Nat. ed. 10. 2: 1261. 1759.
Antheophora elegans Schreb. Besch. Gräs. 2: 105. 1810.
Cenchrus laevigatus Trin. Fund. Agrost. 172. 1820.
Antheophora villosa Spreng. Neu. Entd. 3: 14. 1822.

A leafy ascending or decumbent branching annual with flat thin blades, the erect spikes 5 to 10 cm. long.

A common weed throughout the West Indies and other parts of tropical America. Originally described from Jamaica. *Antheophora elegans* was described from Jamaica. *Cenchrus laevigatus* is a change of name for *A. elegans*. *Antheophora villosa*, described from "India occidentali," is the pubescent form.

21. NAZIA Adans.

Spikelets in clusters of 2 (in our species), their flat faces contiguous, their second glumes outermost, strongly convex, covered with stout uncinate spines.

1. *Nazia aliena* (Spreng.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 28. 1899.

Lappago aliena Spreng. Neu. Entd. 3: 15. 1822.

Tragus berteronianus Schult. Mant. 2: 205. 1824.

A low spreading annual with flat ciliate blades and spikes of small crowded burs.

Open arid ground, southwestern United States and the West Indies to Brazil, whence originally described. The type of *Tragus berteronianus* was from Santo Domingo.

Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, St. Thomas, St. Croix, St. Kitts, and Antigua.

22. LEPTOTHRIMUM Kunth.

Spikelets solitary; glumes much exceeding the single minute floret, the tips diverging, the first subulate, not at all clasping, the second laterally compressed above; pedicel falling with the spikelet, forming a pointed callus.

1. *Leptothrium rigidum* Kunth, Rév. Gram. 1: 156. 1829.

Zoisia rigida Willd.; Kunth, Rév. Gram. 1: 156. 1829, as synonym of *Leptothrium rigidum*.

A densely tufted perennial 30 to 40 cm. tall, with slender rigid short-jointed culms branching toward the summit, short stiff divergent blades, and partially included spikes of narrow spikelets along a slender axis, at first erect, becoming divergent or reflexed.

In sand along the seacoast, Palisadoes, Jamaica, and Santa Marta, Colombia. Originally described from "America calidior."

23. ARUNDINELLA Raddi.

Spikelets short-pedicellate in large panicles; glumes acuminate, the tips widely spreading, the second longer than the first and the sterile lemma; fertile lemma minute, bearded on the callus, bearing a long slender awn from the apex.

Awn tightly twisted below, the column shorter than the second glume.

1. *A. confinis*.

Awn not tightly twisted below, the part below the bend exceeding the glume.

Blades broad and flat, 1 to 2 cm. wide; plants robust, 1.5 to 2 meters tall; sheaths appressed-villous-----2. *A. deppeana*.

Blades narrow and more or less folded or convolute; plants slender, mostly less than 1 meter tall; sheaths usually smooth---3. *A. berteroniana*.

1. *Arundinella confinis* (Schult.).

Piptatherum confine Schult. Mant. 2: 184. 1824.

Arundinella martinicensis Trin. Gram. Pan. 62. 1826.

Agrostis berteriana Spreng.; Steud. Nom. Bot. ed. 2. 1: 39, 143. 1840.

A tufted erect perennial with strong slender simple culms up to 2.5 meters tall, flat blades, scabrous at least on the upper surface, and rather densely flowered oblong panicles 20 to 40 cm. long.

Grassy slopes, West Indies and southern Mexico to Paraguay. Described from Martinique, *Sieber* 265 being the type of *Piptatherum confine* and *Sieber* 262 being the type of *Arundinella martinicensis*. The Cuban name is "cañuela de sabana."

Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, Guadeloupe, Dominica, Martinique, St. Vincent, Trinidad, and Tobago.

2. *Arundinella deppeana* Nees in Steud. Syn. Pl. Glum. 1: 115. 1854.

Similar to the preceding, the panicle branches on the average longer and laxer, the awns longer.

Moist places, Mexico to Brazil; also in central and western Cuba. Originally described from Mexico.

3. *Arundinella berteroniana* (Schult.).

Trichochloa berteroniana Schult. Mant. 2: 209. 1824.

Thysanachne peruviana Presl, Rel. Haenk. 1: 253. 1830.

Muhlenbergia berteroniana Kunth, Enum. Pl. 1: 202. 1833.

Podosaemum virens Balb.; Kunth, loc. cit. as synonym of *Muhlenbergia berteroniana*.

Arundinella peruviana Steud. Syn. Pl. Glum. 1: 115. 1854.

Arundinella cubensis Griseb. Mem. Amer. Acad. n. ser. 8: 533. 1862.

Smaller, more slender than nos. 1 and 2, with narrower, folded or involute blades and more open fewer flowered panicles with slightly larger spikelets.

Moist places, Mexico to Brazil; also Hispaniola and central and eastern Cuba. Originally described from Santo Domingo. *Thysanachne peruviana* was described from Peru. The type specimen of *Arundinella cubensis* is *Wright* 1552.

24. *TRISCENIA* Griseb.

Spikelets short-pedicellate, narrow, awnless, the fruit inclosed in the infolding second glume and sterile lemma.

1. *Triscenia ovina* Griseb. Mem. Amer. Acad. n. ser. 8: 534. 1862.

A tufted perennial with filiform culms and blades, compressed, subindurate sheaths crowded at the base, and attenuate few-flowered panicles.

Only known from two collections from eastern Cuba, the type, *Wright* 756, and *Shafer* 3668 from Piedra Gorda to Río Seboruco.

25. *ACHLAENA* Griseb.

Spikelets with the rachilla produced into a pointed callus; first glume reduced to a long slender awn, the second glume awned from the summit; sterile lemma awnless, infolding the membranaceous fertile lemma and palea.

From Grisebach's description of the genus it is evident that he failed to note the palea, mistaking the sterile lemma for the fertile lemma (*flos fertilis*) and the fertile lemma for the palea, stating as he does that the palea is 1-nerved. *Bentham & Hooker*¹ and *Hackel*² follow Grisebach in this disposition of the

¹ Gen. Pl. 3: 1117. 1883.

² In Engl. & Prantl, Pflanzenfam. 2²: 41. 1887.

genus, probably lacking material for verification of Grisebach's description. Hackel places the genus in Oryzeae, and elsewhere describes a specimen of *A. piptostachya* as *Arthropogon stipitatus*, giving so clear and detailed a description as to leave no doubt of its identity. Grisebach states that there is but 1 stamen; we find 3, as did Hackel in the plant he described under *Arthropogon*. *Achlaena* is closely allied to the South American *Arthropogon* or is possibly congeneric.

1. *Achlaena piptostachya* Griseb. Cat. Pl. Cub. 229. 1866.

Arthropogon stipitatus Hack. Sitzungsber. Akad. Wiss. Math. Naturw. (Wien) 89¹: 125. 1884.

A tufted perennial with stiffly erect culms 0.5 to 1 meter tall, elongate linear firm blades mostly clustered toward the base, and a long-exserted panicle, the fascicled branches stiffly spreading or reflexed at maturity, the long-awned spikelets borne toward the ends.

Open ground, Cuba and Jamaica. Originally described from Cuba, the type being Wright 3487. The type of *Arthropogon stipitatus* was collected in Cuba by Sagra.

Cuba (Province of Pinar del Río and Isle of Pines) and Jamaica (Dolphin Head, Britton & Hollick 2194).

26. LEPTOCORYPHIUM Nees.

Spikelets in narrow panicles; first glume wanting; sterile lemma empty, this and the second glume hairy; fertile lemma and palea brown with a white hyaline, somewhat lacerate or ciliate summit, open at maturity.

1. *Leptocoryphium lanatum* (H. B. K.) Nees, Agrost. Bras. 84. 1829.

Paspalum lanatum H. B. K. Nov. Gen. & Sp. 1: 94. pl. 29. 1816.

Milium lanatum Roem. & Schult. Syst. Veg. 2: 322. 1817.

Panicum fusciflorum Steud. Syn. Pl. Glum. 1: 93. 1854.

Anthaenantia lanata Benth. Journ. Linn. Soc. Bot. 19: 39. 1881.

A slender erect unbranched tufted perennial up to 1 meter tall, with long narrow often involute blades, and loose many-flowered oblong panicles with capillary branchlets and silky-pilose spikelets, the hairs at first appressed, at maturity spreading.

Dry hills and pine barrens, southern Mexico and the West Indies to northern South America. Originally described from Mexico. The type locality of *Panicum fusciflorum* is French Guiana.

Cuba, Porto Rico (Mayaguez),¹ and Trinidad.

27. VALOTA Adans.

Spikelets in pairs, short-pedicellate in 2 rows along one side of a narrow rachis, the slender racemes aggregated in a narrow or flabellate panicle; spikelets lanceolate, clothed with long silky hairs; first glume minute; fruit acuminate, brown with broad white hyaline margins.

Racemes few, usually about 3; blades short, mostly not over 3 cm. long; plants 20 to 40 cm. tall.-----1. *V. eggersii*.

Racemes numerous; blades elongate; plants usually more than 50 cm. tall.

Lower panicle branches in a fascicle on one side of the axis; spikelets densely clothed with tawny or brown silky hairs much exceeding the spikelet-----2. *V. insularis*.

¹ Names of places in Porto Rico are here spelled without diæreses and accents, following the usage of the United States Postal Guide.

Lower panicle branches in a whorl; spikelets sparsely villous, the hairs shorter than the spikelet -----3. *V. laxa*.

1. *Valota eggersii* (Hack.).

Panicum eggersii Hack. Oesterr. Bot. Zeitschr. 51: 292. 1901.

A slender branching perennial, decumbent at base, with small flat puberulent blades and panicles of 2 or 3 erect racemes 2 to 5 cm. long.

Only known from the island of St. Thomas, the type specimen being *Eggers* 295.

2. *Valota insularis* (L.) Chase, Proc. Biol. Soc. Washington 19: 188. 1906.

Andropogon insularis L. Syst. Nat. ed. 10. 2: 1304. 1759.

Panicum lanatum Rottb. Act. Lit. Univ. Hafn. 1: 269. 1778.

Milium villosum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Panicum leucophaeum H. B. K. Nov. Gen. & Sp. 1: 97. 1816.

Panicum insulare Meyer, Prim. Fl. Esseq. 60. 1818.

Trichachne insularis Nees, Agrost. Bras. 86. 1829.

Saccharum polystachyum Sieb.; Kunth, Enum. Pl. 1: 124. 1833.

Panicum saccharoides A. Rich. in Sagra, Hist. Cuba 11: 306. 1850.

Panicum falsum Steud. Syn. Pl. Glum. 1: 67. 1854.

Panicum duchaissingii Steud. Syn. Pl. Glum. 1: 93. 1854.

Tricholaena insularis Griseb. Fl. Brit. W. Ind. 557. 1864.

Digitaria leucophaea Stapf in Thiseit. Dyer, Fl. Cap. 7: 382. 1898.

Syntherisma insularis Millsp. & Chase, Field Mus. Bot. 1: 473. 1902.

Digitaria insularis Mez; Ekman, Ark. för Bot. 13: 22. 1913.

A rather coarse tufted weedy perennial, with sparsely hirsute sheaths, flat, usually scabrous blades, and silky panicles tawny at maturity.

Open ground and waste places in the Tropics and Subtropics of America at low altitudes. The type locality of *Andropogon insularis*, of *Panicum lanatum*, and of *Milium villosum* is Jamaica; of *Saccharum polystachyum*, Martinique; of *Panicum saccharoides* and *P. falsum*, Cuba; of *P. duchaissingii*, the island of Guadeloupe. *Panicum leucophaeum* was described from Venezuela and Colombia. This species is often called "sour-grass," a name which is occasionally applied to other large unpalatable grasses such as species of *Paspalum*. In Cuba it is one of the grasses called "barba de indio," and "rabo de zorra."

To be found in probably all of the West Indian islands.

3. *Valota laxa* (Reichenb.).

Reimaria laxa Reichenb.; Spreng. Tent. Suppl. Syst. Veg. 2. 1828.

Taller than the preceding, decumbent at base, the sheaths tuberculate-hispid, the panicle larger, the long slender branches widely spreading at maturity. The stiff hairs of the sheaths break off in handling and penetrate the skin.

Open moist ground, southern West Indies to Paraguay. Originally described from Surinam [Dutch Guiana].

Grenada, Trinidad, and Tobago.

28. SYNThERISMA Walt.

Spikelets in 2's or 3's, short-pedicellate in two rows along one side of a narrow rachis, the slender racemes digitate or subdigitate; spikelets lanceolate or elliptic; first glume minute or obsolete; fruit acute, the hyaline margins of the lemma narrow.

Rachis narrowly winged on the margins, appearing flat or flattened-triangular.

Pedicels with a ring of stiff hairs at the summit; spikelets with stripes of dense gland-tipped hairs -----7. *S. argyrostachya*.

Pedicels naked.

Second glume as long as the dark fruit; spikelets pubescent.

3. *S. ischaemum*.

Second glume shorter than the fruit; spikelets minutely pubescent or subglabrous.

First glume small but distinct; spikelets about 3 mm. long.

2. *S. sanguinalis*.

First glume obsolete; spikelets less than 2.5 mm. long.

Plants prostrate, forming mats; blades pilose; fruit pale.

5. *S. serotina*.

Plants erect or ascending; blades glabrous or nearly so; fruit black ----- 6. *S. longiflora*.

Rachis not winged.

Second glume and sterile lemma equal; fruit pale; spikelets glabrous or nearly so ----- 4. *S. simpsoni*.

Second glume shorter than the sterile lemma and fruit.

Rachis sparsely beset with scattered spreading long hairs; fruit pale.

1. *S. digitata*.

Rachis with no long hairs; fruit brown.

Spikelets glabrous ----- 8. *S. curvinervis*.

Spikelets with stripes of dense silky hairs.

Spikelets 2.5 to 3 mm. long, with copious long silky hairs extending beyond the apex of the spikelet.

10. *S. leucocoma*.

Spikelets 1.5 to 2 mm. long.

Hairs on the spikelet extending beyond the apex as a stiff brushlike tip ----- 12. *S. argillacea*.

Hairs on spikelet not brushlike at tip and not extending beyond the spikelet.

Blades villous ----- 11. *S. villosa*.

Blades glabrous or nearly so ----- 9. *S. panicea*.

1. *Syntherisma digitata* (Swartz) Hitchc. Contr. U. S. Nat. Herb. 12: 142. 1908.

Milium digitatum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Digitaria horizontalis Willd. Enum. Hort. Berol. 92. 1809.

Axonopus digitatus Beauv. Ess. Agrost. 12, 154. 1812.

Digitaria setigera Roth; Roem. & Schult. Syst. Veg. 2: 474. 1817.

Panicum horizontale Meyer, Prim. Fl. Esseq. 54. 1818.

Digitaria setosa Desv.; Hamilt. Prodr. Pl. Ind. Occ. 6. 1825.

Digitaria jamaicensis Spreng. Syst. Veg. 1: 272. 1825.

Paspalum digitatum Kunth, Rév. Gram. 1: 24. 1829.

Panicum hamiltonii Kunth, Enum. Pl. 1: 84. 1833.

Syntherisma setosa Nash, Bull. Torrey Club 25: 300. 1898.

A decumbent branching stoloniferous weedy annual with pilose sheaths and pubescent, often velvety, flat blades, and 5 to 15 very slender lax racemes up to 8 cm. long, subdigitate or in fascicles along a slender axis.

A common weed in fields, open ground, and waste places, tropical regions of both hemispheres. Originally described from Jamaica; the type of *Digitaria jamaicensis* also from Jamaica. *Digitaria setosa* and *Panicum hamiltonii* were described from the Antilles; *Digitaria setigera* from India; *Digitaria horizontalis* from Santo Domingo. To be found in probably all of the West Indian islands. This is sometimes called in Cuba "pata de gallina fina" (fine henfoot).

2. *Syntherisma sanguinalis* (L.) Dulac, Fl. Haut. Pyr. 77. 1867. CRABGRASS.

Panicum sanguinale L. Sp. Pl. 57. 1753.

Digitaria sanguinalis Scop. Fl. Carn. ed. 2. 1: 52. 1772.

Digitaria marginata Link, Enum. Pl. 1: 102. 1821.

Digitaria fimbriata Link, Hort. Berol. 1: 226. 1827.

Syntherisma fimbriata Nash, Bull. Torrey Club 25: 302. 1898.

Similar to the preceding, commonly larger and coarser, the blades less pubescent, the racemes on the average fewer, the spikelets slightly larger and more closely arranged on the broader rachis. Depauperate specimens may be distinguished by the fewer racemes, larger spikelets, and rachis without scattered long hairs.

A common weed in cultivated soil and waste places throughout the temperate and tropical regions of both hemispheres. To be found on all the West Indian islands. An excellent fodder grass. Originally described from America and southern Europe. *Digitaria marginata* and *Digitaria fimbriata* are described from Brazil. In Cuba this is one of the species to which the name "pata de gallina" is applied.

3. *Syntherisma ischaemum* (Schreb.) Nash, N. Amer. Fl. 17: 151. 1912.

Panicum ischaemum Schreb.; Schweigger, Spec. Fl. Erlang. 16. 1804.

A spreading annual weed, resembling crabgrass, but with glabrous, darker green foliage.

Common in eastern United States; introduced from Europe, whence originally described. Collected in St. Croix (*Benzon*).

4. *Syntherisma simpsoni* (Vasey) Nash, Bull. Torrey Club 25: 297. 1898.

Panicum sanguinale var. *simpsoni* Vasey, Contr. U. S. Nat. Herb. 3: 25. 1892.

Panicum simpsoni Beal, Grasses N. Amer. 2: 109. 1896.

More widely creeping than no. 2, with more slender, pale green racemes with a narrower rachis and finely nerved glabrous or nearly glabrous spikelets.

Sandy soil, Florida and Cuba (Isle of Pines, *Curtiss* 522). Originally described from Manatee, Florida.

5. *Syntherisma serotina* Walt. Fl. Carol. 76. 1788.

Digitaria serotina Michx. Fl. Bor. Amer. 1: 46. 1803.

A low creeping pilose annual, forming a dense carpet, the delicate ascending flowering stems 20 to 30 cm. high, with 3 to 5 more or less arcuate racemes.

Sandy soil, Coastal Plain of the United States from Delaware to Mississippi; also in western Cuba. Originally described from South Carolina.

6. *Syntherisma longiflora* (Retz.) Skeels, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 261: 30. 1912.

Paspalum longiflorum Retz. Obs. Bot. 4: 15. 1786.

Panicum longiflorum Gmel. Syst. Nat. 2: 158. 1791.

Digitaria longiflora Pers. Syn. Pl. 1: 85. 1805.

A slender tufted erect or ascending annual, leafy below, with flat glabrous blades and 2 to several very slender, usually arcuate racemes of minute pale spikelets obscurely silky in the internerves.

Fields and open grassy ground, tropical regions of the Old World; introduced into the West Indies. Originally described from India. The West Indian species appears to be the same as that described under *Digitaria longiflora* by Merrill.¹

Bermuda, Jamaica, Porto Rico, and Trinidad.

7. *Syntherisma argyrostachya* (Steud.).

Panicum argyrostachyum Steud. Syn. Pl. Glum. 1: 40. 1854.

Similar to *S. longiflora*, the blades with a few long hairs at base, the spikelets larger, with stripes of dense silky hairs; pedicels with a ring of stiff hairs at the summit.

¹ Philippine Journ. Sci. C. Bot. Suppl. 1: 347. 1906.

A weed in cultivated soil, introduced in Jamaica (Cinchona). Originally described from Java.

8. *Syntherisma curvinervis* (Hack.).

Panicum curvinerve Hack. Oesterr. Bot. Zeitschr. 51: 335. 1901.

A very slender erect annual, sparingly branching below, with narrow flat blades and about 3 slender racemes with minute glabrous strongly nerved spikelets.

Sandy soil, Pinar del Río, Cuba, whence described, the type collection, *Wright* 1544, mixed with two other species.

9. *Syntherisma panicea* (Swartz) Nash, N. Amer. Fl. 17: 152. 1912.

Milium paniceum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Agrostis jamaicensis Poir. in Lam. Encycl. Suppl. 1: 258. 1810.

Axonopus paniceus Beauv. Ess. Agrost. 12, 154. 1812.

An erect slender glabrous or nearly glabrous perennial with simple culms, narrow blades, often involute and more or less curled in drying, and one to several slender racemes up to 12 cm. long.

Open grassy places, subtropical Florida and the West Indies. Originally described from Jamaica. There is a slight uncertainty in the application of the name *Milium paniceum*. The original description applies to the species described above. The amplified description¹ also applies with the exception of "Rachis 3-quetrae, margine membranaceae." The rachis is only minutely margined. Because of this phrase Nash² has applied the name to *S. longiflora* which has a well-marked rachis margin. In many respects Swartz's later description does not apply to *S. longiflora*. There is no specimen of *Milium paniceum* in the Swartz Herbarium, but there are three specimens sent by Swartz to other herbaria, one at Munich, one at Madrid, and one in the De Candolle Herbarium. All these specimens are *Syntherisma panicea* as here understood. The habitat given by Swartz is "in aridis sabulosis Jamaicae australis", while *S. longiflora* is found in the wet mountain region. The latter species is introduced, probably at a recent date (as it was not known to Grisebach), while the other appears to be indigenous. This species resembles *S. filiformis* of the United States under which name Grisebach³ and Nash⁴ include it, but differs in being apparently perennial and in having longer, more numerous racemes, longer folded or subinvolute blades, and slightly larger spikelets with longer pubescence.

Bahamas (New Providence and Andros), Cuba, Jamaica, Haiti, Santo Domingo, and northern Porto Rico.

10. *Syntherisma leucocoma* Nash, Bull. Torrey Club 25: 295. 1898.

Similar to the preceding, on the average taller and stouter, the racemes longer, the spikelets larger and with dense soft silky hairs slightly exceeding the spikelet.

Sandy woods and barrens, Florida and central and western Cuba. Described from Florida.

11. *Syntherisma villosa* Walt. Fl. Carol. 77. 1788.

?*Panicum domingense* Zuccagni in Roemer, Coll. Bot. 123, 1809.

A tall slender annual or perennial, resembling the preceding but with hirsute foliage, the racemes at maturity more spreading, the pubescence of the spikelets short and crisp.

¹ Fl. Ind. Occ. 1: 179. 1797.

² N. Amer. Fl. 17: 152. 1912.

³ Fl. Brit. W. Ind. 543. 1864.

⁴ Fl. N. Amer. 17: 150. 1912.

Sandy woods, southeastern United States and Cuba (La Grifa la Catolina, *Wright* 3884). Originally described from South Carolina.

12. *Syntherisma argillacea* sp. nov.

A caespitose perennial; culms ascending, slender, branching from the lower nodes, glabrous, 15 to 60 cm. tall, the nodes sparsely pilose; leaves mostly clustered toward the base, olivaceous, the sheaths and upper surface of the blades scabrous, usually rather densely papillose-pilose (sometimes scabrous only), the lower surface of the blades sparsely so; ligule membranaceous, about 0.5 mm. long; blades flat, ascending, 3 to 8 cm. long, 3 to 4 mm. wide, tapering from base to apex; panicle long-exserted, of 1 to 6 (usually 3 or 4) ascending racemes, the common axis 0.5 to 4 cm. long, scabrous on the angles, short-villous in the axils; racemes 1 to 8 cm. long, the slender wingless zigzag rachis scabrous on the angles; spikelets in pairs (rarely in 3's) on slender scabrous pedicels, 2 mm. long (or the hairs slightly exceeding 2 mm.), 0.8 mm. wide; first glume an obscure hyaline rudiment or wanting; second glume about three-fourths the length of the sterile lemma, the margins and internerves of both (except the middle pair of the lemma) densely clothed with thick glistening hairs, some as much as 1 mm. long, exceeding the spikelet as a brushlike tip; fruit dark brown, 1.7 to 1.8 mm. long, 0.7 mm. wide, fusiform, the hyaline lemma margins meeting over the upper half of the palea.

Type in the U. S. National Herbarium, no. 732423, collected on shaded rocks along a trail, Monte Alegrillo, near Maricao, Porto Rico, at an altitude of 800 meters, October 20, 1913, by Agnes Chase (no. 6221).

Probably most nearly related to *Syntherisma leucocoma* and *S. panicea*, from both of which it differs in the short, flat blades. The long hairs of the smaller spikelets are thicker and stiffer than in the spikelets of *S. leucocoma* and longer than in those of *S. panicea*.

Clay soil, Cuba (Herradura, *Tracy* 9104; near Minas, *León* 4785; Guanabacoa, *León* 4715; Manacas, *León* 5843), and Porto Rico (Maricao, *Chase* 6221; Monte Mesa, *Chase* 6271, 6277).

29. THRASYA H. B. K.

Inflorescence a single terminal spikelike raceme, the rachis with membranaceous wings, partially embracing the row of spikelets; spikelets apparently sessile and solitary in a single row, but actually in pairs, the spikelets of each pair back to back, the pedicel of the primary spikelet adnate to the midnerve of the rachis; first glume minute, often hyaline; second glume shorter than the spikelet; sterile lemma subindurate, thinner down the middle, at maturity splitting to the base, the margins of the split rolling inward, the sterile palea nearly as long as its lemma, the margins firm, inclosing a staminate flower or empty; fruit cartilaginous-indurate, commonly with stiff hairs at the summit.

Rachis ciliate with stiff hairs; blades pilose, at least on the margin.

1. *T. paspaloides*.

Rachis not ciliate; blades glabrous or nearly so-----2. *T. robusta*.

1. *Thrasya paspaloides* H. B. K. Nov. Gen. & Sp. 1: 121. pl. 39. 1816.

Panicum thrasya Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 3^e: 228. 1834.

A slender, erect, densely tufted perennial, 25 to 50 cm. tall, at length branching from the upper nodes, with narrow flat pilose blades and long-exserted arcuate racemes 3 to 5 cm. long, the spikelets stiffly ciliate. In referring the

Trinidad specimens to *T. paspaloides*, the type of which we have not seen, allowance is made for evident errors in the description and plate.¹ The only character described not readily to be explained is the long nerveless second glume. In our specimens the second glume is shorter than the spikelet, the midnerve apparent at the base only, the lateral nerves strong, the thin glume readily splitting between them. The plant as a whole, however, well agrees with the original description.

Wet sandy savannas, Trinidad (Aripo Savanna, *Hitchcock* 10081; Piarco Savanna, *Hitchcock* 10335), and Venezuela. Originally described from an island in the Orinoco. This is the species described by Griesbach² as *T. hirsuta*.

2. *Thrasya robusta* sp. nov.

A caespitose perennial; culms erect, rather stout, branching, 1 to 1.5 meters tall, appressed-pubescent at and below the nodes; sheaths scaberulous, ciliate, villous at the throat and pubescent on the collar, the lower crowded, compressed-keeled, sometimes strigose; ligule a short firm membrane about 1 mm. long; blades flat or folded, firm, ciliate, glabrous but roughish beneath or sometimes sparsely puberulent, crisply puberulent above, 15 to 30 cm. long, 4 to 15 mm. wide, the upper smaller, those of the floral branches reduced to a short point; racemes 1 (or occasionally 2), terminating the main culms and the branches from the upper nodes, arcuate, 8 to 14 cm. long, the peduncles slender, long-exserted, or the lower ones partly inclosed by the subtending sheath, villous at the summit; the rachis 2 to 3 mm. wide, glabrous, not ciliate, the margins curved upward embracing the base of the spikelets; spikelets oblong-ellipsoid, 3.2 mm. long, 1.2 mm. wide, about as thick, in a single row, the alternate ones facing in opposite directions, those of a pair being thus back to back; first glume minute, hyaline, nerveless (an occasional nerved well-developed glume found); second glume slightly shorter than the sterile floret, 5-nerved, rather crisply villous; sterile lemma villous, subindurate, early splitting down the center, the edges inrolled, subtending a staminate flower, the palea firm on the margins, as long as its lemma; fruit plano-convex, 2.8 mm. long, 1 mm. wide, elliptical, glabrous, minutely papillose, chartaceous, not very indurate.

Type in the U. S. National Herbarium, no. 865559, collected in a savanna at St. Joseph, Trinidad, December 23, 1912, by A. S. Hitchcock (no. 10187).

The only other specimen seen by us was collected in the wet sandy Piarco Savanna, south of Arouca, Trinidad (*Hitchcock* 10352).

30. MESOSETUM Steud.

Inflorescence a single erect terminal spikelike raceme, the spikelets subsessile, solitary, in two rows on one side of a slender rachis, the back of the fruit turned from the rachis, ventricose on the side toward the rachis and fitting into its concavities, the back of the spikelet flat or nearly so; glumes and sterile lemma usually bearing stiff hairs on the strong lateral nerves, the midnerve of the sterile lemma faint or suppressed; sterile palea wanting; fruit ventricose on the palea side.

Racemes 6 to 12 cm. long; second glume (outer one) three-fourths as long as the spikelet ----- 1. *M. loliiforme*.
Racemes 3 to 4 cm. long; second glume exceeding the spikelet --- 2. *M. wrightii*.

¹ See Chase, Proc. Biol. Soc. Washington 24: 112-114. 1911.

² Fl. Brit. W. Ind. 540. 1864.

1. *Mesosetum loliiforme* (Hochst.) Chase, Bot. Gaz. 51: 302. 1911.*Panicum loliiforme* Hochst.; Steud. Syn. Pl. Glum. 1: 56. 1854.

A slender tufted erect or ascending perennial with yellowish green hirsute foliage, the blades flat, narrow, often elongate, the pale flattened spike 6 to 12 cm. long.

Sandy pine woods, Cuba (Province of Pinar del Río and Isle of Pines) and northern South America. Originally described from Surinam.

2. *Mesosetum wrightii* Hitchc. Contr. U. S. Nat. Herb. 12: 211. 1909.

Perennial, the slender culm ascending from a creeping base, the short flat blades sparsely hirsute, the spikes 3 to 4 cm. long.

Sandy pine woods, Cuba (Dayaniguas, Pinar del Río, *Wright* 3859, the type; Placetas del Sur, Santa Clara, *León* 6430).

31. *ERIOCHLOA* H. B. K.

Inflorescence of few to many racemes along a common axis; spikelets subsessile, solitary, the back of the fruit turned from the slender rachis; internode of the rachilla between the first and second glumes thickened, forming a ringlike base to the spikelet, the first glume usually reduced to an obscure sheath adnate to the ring; fruit minutely papillose-rugose, mucronate-pointed or with a delicate, often deciduous awn.

Blades filiform ----- 1. *E. filifolia*.

Blades flat, 2 to 15 mm. wide.

Spikelets acute; first glume present ----- 4. *E. subglabra*.

Spikelets long-acuminate; first glume obsolete.

Fruit tipped with a slender awn 1 mm. long; spikelets 4 to 5 mm. long ----- 3. *E. punctata*.

Fruit merely apiculate; spikelets 3 mm. long ----- 2. *E. ramosa*.

1. *Eriochloa filifolia* Hitchc. Contr. U. S. Nat. Herb. 12: 207. 1909.

A low tufted perennial with filiform culms and blades and small panicles of 2 or 3 short racemes of acuminate silky spikelets.

Sterile hills, Cuba, the type collected by Hitchcock on the Jata Hills, the only locality known for the species.

2. *Eriochloa ramosa* (Retz.) Kuntze, Rev. Gen. Pl. 2: 775. 1891.*Milium ramosum* Retz. Obs. Bot. 6: 22. 1791.*Eriochloa annulata* Kunth, Rév. Gram. 1: 30. 1829.

A slender ascending glabrous annual with sparingly branching culms, linear blades 2 to 5 mm. wide, and pale panicles of few to several erect or ascending racemes; spikelets silky.

Introduced in Cuba (Zaza, *León* 852). Originally described from India.

3. *Eriochloa punctata* (L.) Desv.; Hamilt. Prodr. Pl. Ind. Occ. 5. 1825.*Milium punctatum* L. Syst. Nat. ed. 10. 2: 872. 1759.*Oedipachne punctata* Link, Hort. Berol. 1: 51. 1827.*Helopus punctatus* Nees, Agrost. Bras. 16. 1829.*Monachne punctata* Nash, Bull. Torrey Club 30: 374. 1903.

Larger than the preceding, usually 1 meter or more tall; blades up to 15 mm. wide, the panicles with several to many ascending branches.

Swamps and ditches, southern United States through the West Indies and eastern Mexico to Brazil. Originally described from Jamaica.

Cuba, Jamaica, Santo Domingo, Porto Rico, St. Thomas, St. Croix, Tortola, Antigua, Montserrat, Guadeloupe, Dominica, Martinique, St. Vincent, Grenada, Barbados, Trinidad, and Tobago.

4. *Eriochloa subglabra* (Nash) Hitchc. Contr. U. S. Nat. Herb. 12: 208. 1909.*Monachne subglabra* Nash, Bull. Torrey Club 30: 374. 1903.*Eriochloa punctata* var. *subglabra* Urban, Symb. Antill. 4: 85. 1903.

A stoloniferous perennial with erect flowering culms 1 to 2 meters tall, bearded nodes, flat spreading blades, and terminal panicles of several to many loosely ascending or spreading branches, the spikelets usually in pairs.

Moist ground, swamps, and ditches, West Indies and Brazil. Originally described from Porto Rico, the type being *Heller* 380, collected at Martin Peña. In Porto Rico this species is confused with Pará grass, which it resembles in habit, and the name "malojilla" is applied to both. The two species are not infrequently found growing together.

Jamaica (Savanna-la-Mar, *Hitchcock* 9859), Porto Rico, Trinidad, and Brazil.

32. *BRACHIARIA* (Trin.) Griseb.

Inflorescence of few to several rather thick racemes; spikelets solitary, subsessile, the back of the fruit turned from the rachis; first glume well developed.

1. *Brachiaria platyphylla* (Griseb.) Nash in Small, Fl. Southeast. U. S. 81. 1903.*Paspalum platyphyllum* Griseb. Cat. Pl. Cub. 230. 1866.

Glabrous; culms ascending from a creeping base, rather freely branching; blades flat, 5 to 10 cm. long, about 1 cm. wide; inflorescence included at base, of 1 to 4 rather distant finally spreading racemes with a flat rachis and sessile ovoid spikelets appearing to be in a single row.

Sandy soil, Province of Pinar del Río, Cuba, whence originally described. In the Catalogue of the Grasses of Cuba¹ this species is referred to *B. plantaginea*. Subsequent collections of mature specimens show the Cuba species to be distinct from *B. plantaginea* of the continent.

BRACHIARIA ERUCAEFORMIS (J. E. Smith) Griseb. in Ledeb. Fl. Ross. 4: 469. 1833. *Panicum erucaeforme* J. E. Smith in Sibth. Fl. Graec. Prodr. 1: 40. 1806. There is in the U. S. National Herbarium a specimen of this species from Barbados (*Bot. Sta. Herb.* 448). It may have been cultivated at the Botanic Station. In the Krug and Urban Herbarium there is a specimen from the same island collected by Eggers (no. 7095).

33. *AXONOPUS* Beauv.

Inflorescence of 2 to many slender racemes, aggregated at the summit of the culm; spikelets depressed-biconvex, oblong-elliptic, solitary, subsessile, the back of the fruit turned from the rachis; first glume wanting; sterile palea obsolete.

Rachis bearing conspicuous stiff spreading golden yellow hairs. (Section CABRERA.)

Plants annual; rachis over 1 mm. wide, extending beyond the spikelets.

1. *A. appendiculatus*.

Plants perennial; rachis slender, about 0.5 mm. wide, not extending beyond the spikelets.

2. *A. aureus*.

Rachis not bearing stiff hairs. (*AXONOPUS* proper.)

Plants annual, the delicate racemes 2 or 3.

3. *A. capillaris*.

Plants perennial.

Plants stoloniferous, the racemes 2 to 5.

4. *A. compressus*.

Plants erect, without stolons.

¹ Contr. U. S. Nat. Herb. 12: 212. 1909.

Racemes 100 or more, the axis elongate-----7. *A. pellitus*.

Racemes 4 to several.

Blades glabrous; racemes several; spikelets acute.

6. *A. macrostachyus*.

Blades, at least when young, ciliate and more or less villous;

racemes few; spikelets obtuse-----5. *A. equitans*.

1. *Axonopus appendiculatus* (Presl).

Paspalum appendiculatum Presl, Rel. Haenk. 1: 211. 1830.

A slender sparingly branching annual with long smooth orange-colored internodes, thin yellowish green, sparsely hispid or glabrous, flat blades and 2 to 8 subdigitate racemes 3 to 6 cm. long, the flat green rachis bearing a row of stiff golden hairs on each margin and down the center between the 2 rows of small glabrous spikelets sunken in the rachis. A strikingly beautiful species.

Open grassy hillsides, Trinidad (St. Joseph, *Hitchcock* 10173) and northern South America. Originally described from Panama.

2. *Axonopus aureus* Beauv. Ess. Agrost. 12. 1812.

Paspalum exasperatum Nees, Agrost. Bras. 81. 1829.

Panicum chrysites Steud. Syn. Pl. Glum. 1: 38. 1854.

A tall slender branching perennial with wiry compressed culms, rather firm spreading flat blades, and a handsome inflorescence of 4 to 15 subdigitate slender golden-brown racemes, the stiff orange yellow hairs in tufts below the spikelets as well as along the margins.

Wet sandy savannas, Porto Rico and northern South America. Type locality not indicated in the original description. This species is described by Grisebach¹ under the name *Paspalum pulchrum*.

Porto Rico (Happy Hollow, near Rio Piedras) and Trinidad (Piarco Savanna).

3. *Axonopus capillaris* (Lam.) Chase, Proc. Biol. Soc. Washington 24: 133. 1911.

Paspalum capillare Lam. Tabl. Encycl. 1: 176. 1791.

Paspalum minutum Trin. Linnaea 10: 293. 1836.

A slender ascending branching, nearly glabrous annual, with thin blades 2.5 to 5 cm. long and about 4 mm. wide and with 2 or 3 delicate racemes about 2.5 cm. long on long subcapillary peduncles.

Forming patches on moist open ground, Central America to Trinidad (Pitch Lake, *Hitchcock* 10101) and Brazil. Originally described from tropical America, the exact locality not given. The type of *Paspalum minutum* is from Peru.

4. *Axonopus compressus* (Swartz) Beauv. Ess. Agrost. 12. 1812. CARPET GRASS.

Milium compressum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Paspalum platycaulon Poir. in Lam. Encycl. Suppl. 5: 34. 1804.

Paspalum compressum Raspail, Ann. Sci. Nat. 5: 301. 1825.

Digitaria platycaulis Desv. Opusc. 62. 1831.

Digitaria domingensis Desv.; Kunth, Enum. Pl. 1: 49. 1833, as synonym of

Paspalum platycaule Poir.

?*Paspalum filostachyum* A. Rich.; Steud. Syn. Pl. Glum. 1: 20. 1854.

Anastrophus compressus Schlecht.; Doell in Mart. Fl. Bras. 2³: 102. 1877.

A nearly glabrous perennial, under favorable conditions producing long leafy stolons with short broad obtuse blades, the flowering culms erect or ascending, compressed, with rather thin blades 8 to 10 mm. wide, and 2 to 5 slender racemes along a short axis, 2 or 3 secondary peduncles often produced from the upper

¹ Fl. Brit. W. Ind. 543. 1864.

node. This species is exceedingly variable in habit; in dry ground it sometimes has blades not over 2 or 3 mm. wide.

Moist grass land, southern United States to Argentina; also in the warmer parts of the Old World. Originally described from Jamaica. *Paspalum platycaulon* was described from Porto Rico, and *P. filostachyum* from the Antilles.

This species is an important pasture grass throughout the West Indies. Readily propagating by stolons, it tends to drive out other species, thus becoming dominant in lowland pastures. In Cuba this grass is called "cañamazo dulce," "cañamazo de sabana," and "cañamazo macho."

5. *Axonopus equitans* sp. nov.

Perennial; culms erect, glabrous, 40 to 60 cm. tall, apparently branching only at the base; sheaths broad, compressed, keeled, the lower crowded and equitant, villous near the margin and on the collar, those of the stem 2, overlapping; ligule a dense row of hairs about 1 mm. long; blades rather stiffly ascending, flat, from a folded base, ciliate, rather sparsely villous on the lower surface, or the cauline glabrate, rather obtuse, 15 to 20 cm. long, 4 to 10 mm. wide, the uppermost 3 to 5 cm. long; racemes about 4, erect or ascending, slender, pubescent or somewhat villous at base, 7 to 15 cm. long, the rachis 3-angled, scarcely 0.5 mm. wide, the main axis 3 to 5 cm. long; spikelets nearly sessile, oblong, 2 mm. long, obtuse, in 2 rows, not crowded, the apex of one not reaching the base of the one above on the same side, sometimes not reaching the one on the opposite side; second glume rather strongly several-nerved, very minutely silky-pubescent at base and in a line down the internerves; sterile lemma equaling the second glume, 3-nerved, sparsely villous; fruit about as long as the second glume and sterile lemma, chartaceous, yellowish, obscurely pubescent at the tip.

Type in the U. S. National Herbarium, no. 865560, collected in grass land along the Fort George Road, Port of Spain, Trinidad, November 27, 1912, by A. S. Hitchcock (no. 9988).

6. *Axonopus macrostachyus* sp. nov.

Perennial; culms erect, glabrous, branching, 1 to 1.5 meters tall, the cauline nodes about 2; sheaths glabrous, keeled but not strongly compressed, the lower bladeless; ligule a ciliate membrane less than 1 mm. long; blades flat, stiffly erect, those of the innovations conspicuously so, glabrous, scaberulous on the margin, abruptly rounded at the apex, as much as 50 cm. long, the uppermost about 12 cm. long, 4 to 7 mm. wide; racemes about 12, slender, erect or stiffly ascending, 15 to 25 cm. long, the main axis about 12 cm. long, the rachis 3-angled, narrow, 0.5 to 0.7 mm. wide, glabrous, scaberulous on the angles, slightly pubescent or villous at the base; spikelets in two rows, nearly sessile, each reaching scarcely to the base of the one on the same side or somewhat more distant, oblong-elliptic, acute, 3 mm. long, scarcely 1 mm. wide, whitish or purplish; second glume and sterile lemma thin, pointed beyond the fruit, 3-nerved or the midnerve faint or suppressed, minutely silky at base and on the margins, sometimes also in the internerves; fruit oblong, obtuse, 2 mm. long, minutely papillose-roughened, at maturity yellowish brown.

Type in the U. S. National Herbarium, no. 865561, collected in low open ground north of Pitch Lake, Trinidad, December 7, 1912, by A. S. Hitchcock (no. 10093).

Known only from the type collection.

7. *Axonopus pellitus* (Nees).

Paspalum pellitum Nees; Trin. Gram. Pan. 89. 1826.

A tall flat-stemmed perennial with broad overlapping hirsute sheaths densely hairy on the collar, elongate, rather stiff, sparsely pilose blades, and an elongate

panicle of numerous laxly spreading racemes densely woolly in the axils, the plump oval spikelets with lines of silky pubescence.

Open grass land, Trinidad (Pitch Lake, *Hitchcock* 10094) to Brazil. Originally described from Brazil.

34. REIMAROCHLOA Hitchc.

Inflorescence of 2 to several slender racemes, approximate at the summit of the culm, spreading or reflexed at maturity; spikelets strongly compressed, acuminate, solitary, rather distant, subsessile, appressed to the flat rachis, the back of the fruit toward it as in *Paspalum*; both glumes wanting (or the second present in the terminal spikelet); fruit scarcely indurate, the palea free nearly half its length.

Spikelets about 2 mm. long; racemes several.....1. *R. brasiliensis*.
Spikelets about 5 mm. long; racemes 2 or 3.....2. *R. oligostachya*.

1. *Reimarochloa brasiliensis* (Spreng.) Hitchc. Contr. U. S. Nat. Herb. 12: 198. 1909.

Agrostis brasiliensis Spreng. Nov. Prov. Hal. 45. 1819.

Reimaria conferta Nees; Trin. Gram. Pan. 59. 1826.

Reimaria brasiliensis Schlecht. Bot. Zeit. 10: 17. 1852.

Panicum oxyanthum Steud. Syn. Pl. Glum. 1: 41. 1854.

A tufted stoloniferous branching perennial, the leafy ascending flowering culms scarcely more than 10 cm. tall, with loose sheaths, flat rather lax blades, and about 10 delicate digitate racemes, the spikelets silky along the margin.

Wet ground around ponds, Cuba (Hanábana and Isle of Pines) and Santo Domingo to Brazil. Originally described from Brazil. The type of *Reimaria conferta* is from Brazil; of *Panicum oxyanthum* from Santo Domingo.

2. *Reimarochloa oligostachya* (Munro) Hitchc. Contr. U. S. Nat. Herb. 12: 199. 1909.

Reimaria oligostachya Munro; Benth. Journ. Linn. Soc. Bot. 19: 34. 1882.

Stouter than the preceding, the flat culms often elongate, decumbent with ascending ends; racemes 1 to 3, terminal and axillary, stiff, at maturity widely divergent or deflexed.

Wet soil around ponds, Florida and Cuba (Hanábana, *Wright* 3854 in part). Originally described from eastern Florida.

35. PASPALUM L.

Inflorescence of 1 to many racemes, these racemose along a common axis; spikelets plano-convex, subsessile along a slender or winged rachis, the back of the fruit turned toward it; first glume typically wanting, present in a few species; fertile lemma and palea chartaceous-indurate.

Rachis with broad membranaceous wings more or less infolding the spikelets.

Spikelets clothed with long silky hairs; rachis margins golden yellow.

4. *P. heterotrichon*.

Spikelets glabrous; rachis margins green.

Racemes numerous, approximate.....3. *P. repens*.

Racemes few, distant.

Spikelets 2 mm. long, obovate.....1. *P. dissectum*.

Spikelets 3.2 to 3.4 mm. long, elliptic.....2. *P. serratum*.

Rachis without broad membranaceous wings.

Spikelets with a broad stiff lacerate margin.....19. *P. fimbriatum*.

Spikelets not lacerate-margined.

Inflorescence a large flabellate panicle of numerous racemes, the spikelets solitary.

Spikelets glabrous -----51. *P. fasciculatum*.

Spikelets with long silky hairs on the margin; racemes very slender.

60. *P. saccharoides*.

Inflorescence not flabellate, or if slightly so the spikelets in pairs.

Racemes 2, conjugate at the summit of the culm, rarely a third below.

Spikelets elliptic or narrowly ovate.

Culms erect, not stoloniferous nor rhizomatous-----20. *P. neesii*.

Culms ascending or erect from creeping stolons or rhizomes.

• Second glume pubescent; spikelets somewhat turgid.

7. *P. distichum*.

Second glume and sterile lemma glabrous; spikelets flattened.

Blades erect or ascending, involute-setaceous--6. *P. distachyon*.

Blades spreading, tapering from base to apex, the margins involute -----5. *P. vaginatum*.

Spikelets suborbicular, broadly ovate or obovate.

Spikelets concavo-convex, sparsely long-silky around the margin; plants stoloniferous-----50. *P. conjugatum*.

Spikelets plano-convex, not silky-margined.

Spikelets 1.5 mm. or less long, more or less pubescent.

Plants annual; spikelets or some of them sprinkled with globular hairs -----45. *P. multicaule*.

Plants perennial; spikelets minutely pubescent.

47. *P. clavuliferum*.

Spikelets 1.8 to 3 mm. long, glabrous.

Spikelets golden brown, transversely marked with dark lines.

13. *P. serpentinum*.

Spikelets green, not marked.

Sheaths pubescent; spikelets about 1.8 mm. long.

12. *P. pumilum*.

Sheaths glabrous or sparsely ciliate only.

Spikelets less than 2.5 mm. long-----11. *P. minus*.

Spikelets 2.5 to 3 mm. long -----10. *P. notatum*.

Racemes 1 to many, racemose or fascicled on the axis, not conjugate.

Second glume wanting; sterile lemma dark crimson.

59. *P. pulchellum*.

Second glume present.

First glume present on at least one of the pair of spikelets.

Spikelets pubescent -----43. *P. ciliiferum*.

Spikelets glabrous.

Spikelets 1.5 mm. long-----41. *P. decumbens*.

Spikelets 2.6 to 3 mm. long.

Plants with hard scaly rhizomes-----57. *P. unispicatum*.

Plants more or less stoloniferous but having no rhizomes.

58. *P. pilosum*.

First glume normally wanting (rarely present on occasional spikelets).

Fruit dark brown and polished (see also no. 52 with brown but not polished fruit).

Plants annual.

Spikelets 2 to 2.2 mm. long; plants glabrous.

17. *P. melanospermum*.

Spikelets 2.4 to 3 mm. long; plants more or less pubescent.

18. *P. convexum*.

Plants perennial.

Spikelets elliptic; sterile lemma not transversely rugose.

16. *P. wrightii*.

Spikelets obovate to suborbicular; sterile lemma undulate-rugose just within the raised margin.

Blades flat, lax, broader at base than the summit of the sheath; culms decumbent at base-----15. *P. olivaceum*.

Blades conduplicate at base, stiff; culms erect.

14. *P. plicatum*.

Fruit not dark brown and polished (brown but not polished in *P. virgatum*).

Racemes numerous, usually 15 or more (5 to 10 in *P. secans*, 1 to 2 meters tall).

Spikelets about 1.3 mm. long, subhemispheric, pubescent.

44. *P. paniculatum*.

Spikelets 1.8 mm. or more long.

Spikelets pubescent.

Fruit pale; spikelets elliptic, 2 mm. long.

56. *P. coryphaeum*.

Fruit brown; spikelets obovate, 3 mm. long.

52. *P. virgatum*.

Spikelets glabrous; blade margins sharply serrulate.

Spikelets elliptic or narrowly obovate; rachis glabrous; lower sheaths not nodulose-----53. *P. secans*.

Spikelets suborbicular or broadly obovate; rachis pilose, at least sparsely so; lower sheaths nodulose.

Rachis densely pilose; spikelets 1.8 to 2 mm. long.

55. *P. densum*.

Rachis sparsely pilose; spikelets 2 to 2.2 mm. long.

54. *P. millegrana*.

Racemes 1 to 5, rarely more.

Spikelets 2 mm. or more long.

Racemes subcylindrical, solitary (rarely 2); spikelets solitary, mostly rugose.

Blades pubescent, flat or subinvolute-----24. *P. nanum*.

Blades glabrous, concavo-convex in cross section.

Spikelets 2 mm. long; glume and sterile lemma not pointed beyond the fruit-----22. *P. filiforme*.

Spikelets 2.7 to 3 mm. long; glume and sterile lemma pointed beyond the fruit-----23. *P. lindenianum*.

Racemes not cylindrical, one or more; spikelets not rugose.

Blades not over 2.5 mm. wide, strongly involute; spikelets pubescent.

Blades glabrous, usually exceeding the racemes.

25. *P. alterniflorum*.

Blades pilose, short, clustered toward the base.

26. *P. rottboellioides*.

Blades 3 to 10 mm. wide, flat or becoming involute in drying.

Rachis 2 to 2.5 mm. wide; culms mostly decumbent at base; spikelets abruptly minutely pointed.

Spikelets glabrous, about 2.5 mm. long.

9. *P. denticulatum*.

Spikelets pubescent, 3 to 3.2 mm. long.

8. *P. pubiflorum*.

Rachis less than 1 mm. wide.

Blades firm, more or less involute-margined, narrower at the base than the summit of the sheath.

Culms 0.5 to 1 meter tall, not geniculate; blades elongate; spikelets pubescent (rarely glabrous).

35. *P. glabrum*.

Culms 20 to 40 cm. long, spreading, geniculate below; blades not over 10 cm. long; spikelets glabrous.

36. *P. bakeri*.

Blades thin, flat, mostly more or less ciliate, broader at the base than the summit of the sheath.

Spikelets glabrous; blades linear, scarcely 4 mm. wide, firm; culms stiffly erect from a short knotty rhizome -----

37. *P. rigidifolium*.

Spikelets minutely pubescent (exceptionally glabrous); blades lanceolate.

Blades short-pubescent and pilose on the upper surface -----

40. *P. debile*.

Blades glabrous on the surface or exceptionally with a few hairs.

Spikelets ovate to suborbicular; blades lax.

39. *P. ciliatifolium*.

Spikelets obovate; blades somewhat stiff.

38. *P. propinquum*.

Spikelets not over 1.8 mm. long, usually less.

Plants annual, tufted, pilose; blades linear.

Spikelets orbicular or nearly so, at least some of them sprinkled with globular hairs -----

45. *P. multicaule*.

Spikelets elliptic, glabrous -----

46. *P. parviflorum*.

Plants perennial.

Culms creeping or decumbent and rooting at the nodes.

Spikelets pubescent -----

49. *P. reptatum*.

Spikelets glabrous.

Blades appressed-pubescent, commonly 8 to 10 cm. long; spikelets 1.8 mm. long -----

42. *P. nutans*.

Blades glabrous; spikelets 1.4 mm. or less long.

Racemes solitary, 1 to 1.2 cm. long -----

31. *P. breve*.

Racemes 2 or 3, 2 to 3 cm. long; spikelets minute, yellowish -----

48. *P. orbiculatum*.

Culms tufted, not creeping nor decumbent.

Racemes 2 to 10.

Nodes appressed-pubescent; spikelets usually solitary.

29. *P. poiretii*.

Nodes glabrous; spikelets in pairs.

Spikelets about 1.3 mm. long, obovate, blunt, crowded, glandular-pubescent.

34. *P. simpsoni*.

Spikelets 1.5 to 1.8 mm. long, elliptic.

Primary pedicel much shorter than its spikelet, the spikelets crowded.

Racemes 2 to 3 cm. long, rather thick.

32. *P. caespitosum*.

Racemes 5 to 10 cm. long, slender.

35. *P. glabrum*.

Primary pedicel nearly as long as its spikelet, the spikelets not crowded; racemes slender.

33. *P. portoricense*.

Racemes solitary.

Blades not over 1 mm. wide, concavo-convex or subterete in cross section.

Plants delicate; blades subterete.

30. *P. capillifolium*.

Plants wiry; blades concavo-convex.

21. *P. leptocaulon*.

Blades or some of them 2 mm. or more wide, flat or involute.

Nodes glabrous; culms leafy; blades flat; spikelets in pairs.

Blades 5 to 8 mm. wide-----38. *P. propinquum*.

Blades not over 3 mm. wide.

47. *P. clavuliferum*.

Nodes appressed-pubescent; culms delicate, the leaves mostly clustered at the base; spikelets solitary (rarely a few paired).

Spikelets pubescent-----29. *P. poiretii*.

Spikelets glabrous.

Spikelets 1 mm. long-----27. *P. rupestre*.

Spikelets 1.5 mm. long-----28. *P. leoninum*.

1. *Paspalum dissectum* (L.) L. Sp. Pl. ed. 2. 1: 81. 1762.

Panicum dissectum L. Sp. Pl. 57. 1753.

Paspalum membranaceum Walt. Fl. Carol. 75. 1788.

A subaquatic glabrous creeping perennial with flat spreading blades about 5 cm. long and few short racemes, the rachis broad, membranaceous, inflexed over the base of the small pale oval spikelets.

On muddy banks of ponds and ditches or in shallow water, southeastern United States and Cuba. Originally described from North America, probably Delaware; *P. membranaceum* described from South Carolina.

2. *Paspalum serratum* sp. nov.

A glabrous aquatic perennial with rather soft elongate sparingly branching culms, as much as 1.5 meters long, bearing a few rootlets at the nodes, the internodes flattened, more or less angled in drying; sheaths thin, loose, overlapping on the flowering branches; ligule 2 mm. long, hyaline, erose; blades suberect, soft, thin, flat, 3.5 to 9 cm. long, 4 to 7 mm. wide, abruptly rounded at base; panicles terminal on leafy branches, short-exserted or included at base, consisting of 2 (rarely 1) divergent racemes, the slender common axis about 12 mm. long; racemes 3 to 4.5 cm. long, the rachis membranaceous, green, 3 to 3.5 mm. wide, the margins inflexed over the base of the spikelets, naked at the base, terminating at the base of the uppermost spikelet; spikelets solitary in two rows, 3.2 to 3.4 mm. long, 1.4 mm. wide, elliptic, acute, the thin faintly 3-nerved glume and sterile lemma pointed beyond the fruit; fruit elliptic-

obovate, obscurely papillose-roughened, the very tip bearing a few minute thick hairs.

Type in the U. S. National Herbarium, no. 694431, collected in the water of a small pool, Troy, Jamaica, November 6, 1912, by A. S. Hitchcock (no. 9795).

Paspalum serratum is most nearly related to *P. dissectum*, from which it differs in its sparingly branching habit, less leafy culms, and larger pointed spikelets. Known only from the type collection and from a fragmentary specimen in the Grisebach Herbarium, collected by Alexander Prior in Jamaica.

3. *Paspalum repens* Berg. Act. Helv. Phys. Math. 7: 129. pl. 7. 1772.

Ceresia fluitans Ell. Bot. S. C. & Ga. 1: 109. 1816.

Paspalum fluitans Kunth, Rév. Gram. 1: 24. 1829.

An aquatic or subaquatic perennial, with submerged stems and floating branches buoyed up by the inflated sheaths, with thin flat blades and with panicles of numerous spreading racemes, the small flat elliptic whitish spikelets in 2 rows on the broad green rachis.

In sluggish streams or standing water, southeastern United States to Paraguay. Originally described from Dutch Guiana; *Ceresia fluitans* described from Georgia.

Western Jamaica and Trinidad (Caroni Savanna).

PASPALUM RACEMOSUM Lam.¹ (*P. stoloniferum* Bosc).² A South American creeping perennial with tawny or ferruginous panicles of numerous short racemes, the spikelets with deeply fluted glume and sterile lemma, cultivated as an ornamental in the Tropics, sometimes escaped. Collected in Habana-Vedado, León 759.

4. *Paspalum heterotrichon* Trin. Gram. Icon. 3: pl. 285. 1831.

Paspalum heterotrichon var. *paucispicatum* Hack. Notizbl. Bot. Gart. Berlin 1: 328. 1897.

A tall very slender wiry perennial leaning upon or clambering among other vegetation, branching above, the narrow spreading blades becoming involute, the few racemes with a broad golden yellow membranaceous rachis and silvery silky spikelets.

Open grassy slopes and savannas, at moderate altitudes, Panama to Brazil, whence originally described, and in Haiti, the type locality of the variety.

5. *Paspalum vaginatum* Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Digitaria foliosa Lag. Gen. & Sp. Nov. 4. 1816.

Paspalum brachiatum Trin.; Nees, Agrost. Bras. 62. 1829.

Paspalum foliosum Kunth, Rév. Gram. 1: 25. 1829.

Paspalum inflatum A. Rich. in Sagra, Hist. Cuba 11: 298. 1850.

Paspalum distichum var. *vaginatum* Swartz; Griseb. Fl. Brit. W. Ind. 541. 1864.

Sanguinaria vaginata Bubani, Fl. Pyren. 4: 258. 1901.

An extensively creeping perennial with loose sheaths and spreading involute-margined blades 2 to 6 mm. wide, tapering from base to apex, the sterile runners often stout with closely imbricate leaves, the flowering branches ascending, commonly 20 to 30 cm. tall, with a pair of divergent racemes (rarely 3) at the apex, the flat acuminate spikelets usually 3 to 4 mm. long.

Sea coasts and brackish sands, Gulf Coast and the West Indies to South America. Originally described from Jamaica; *Digitaria foliosa* and *Paspalum*

¹ Tabl. Encycl. 1: 176. 1791.

² Trans. Linn. Soc. 2: 83. pl. 16. 1794.

inflatum described from Habana, Cuba; *P. brachiatum* was a name in Sieber's herbarium of Martinique.

Bermuda, Bahamas (New Providence, Long Cay), Cuba, Jamaica, Porto Rico, St. Croix, Martinique, Barbados, Trinidad, and Tobago.

6. *Paspalum distachyon* Poit.; Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 142. 1834.

An erect perennial with slender striate yellow rhizomes and tufted erect slender wiry glabrous culms 20 to 40 cm. tall; sheaths about as long as the internodes or slightly overlapping, glabrous or with a few hairs at the summit; ligule membranaceous, about 0.2 mm. long; blades erect or ascending, 5 to 10 cm. long (rarely longer), 1 to 2 mm. wide, involute, glabrous or obscurely pubescent on the upper surface; racemes 2 at the apex of the culm, usually naked at the base, 3 to 5.5 cm. long, 2 mm. broad or slightly broader, erect or slightly divergent, the flexuous rachis 0.5 to 0.7 mm. wide, minutely scabrous on the margin; spikelets solitary, glabrous, on minute pubescent pedicels, not at all imbricate, 2.6 to 3 mm. long, 1.4 mm. wide, abruptly acuminate, the glume and sterile lemma equal, exceeding the fruit, 3-nerved, or the midnerve of the sterile lemma occasionally suppressed, the lemma sometimes transversely wrinkled; fruit about 2.1 mm. long, 1.2 mm. wide, subacute.

Closely related to *P. vaginatum* but much more slender, rhizomatous instead of stoloniferous, or very rarely producing stolons as well as rootstocks, the sheaths not crowded nor inflated, the blades narrower, softer, and involute-setaceous. *Paspalum distachyon* might be supposed to be a depauperate form of *P. vaginatum* but that depauperate forms of that species are dwarfed and stout, not elongate and slender. The specimens cited below are remarkably uniform in character, *P. distachyon* being apparently much less variable than *P. vaginatum* or *P. distichum*.

Moist or dry brackish or alkaline soil, mostly near the coast, Cuba and Jamaica. Described from "Doming[o]." The type has not been examined, but the description so well applies to our specimens as to leave little doubt of their identity.

Cuba (Habana, Tiffin (Camaguey), and Victoria de las Tunas) and Jamaica (Montego Bay, Savanna-la-Mar, Black River, and Inverness).

7. *Paspalum distichum* L. Syst. Nat. ed. 10. 2: 855. 1759.

Similar to *P. vaginatum*, the flowering culms commonly taller, the blades slightly wider and softer.

Ditches and wet (rarely brackish) places, southern United States and West Indies to South America; also in the Old World. The source of Linnæus's specimen is unknown. Called "sacasebo" in Cuba.

Bermuda, Bahamas (New Providence, Watling Island), Cuba, Jamaica, Porto Rico, St. Croix, Antigua, Martinique, Guadeloupe, St. Lucia, Grenada, Trinidad, and Tobago.

8. *Paspalum pubiflorum* Rupr.; Fourn. Mex. Pl. 2: 11. 1886.

Culms compressed, usually decumbent at base, the nodes and sheaths commonly pubescent; blades flat, 8 to 12 cm. long, 5 to 6 mm. wide; racemes few to several, ascending, rather stout; 1 to 5 cm. distant on the axis; the spikelets in pairs, pubescent.

Along ditches and in waste ground, southwestern United States to Bolivia; represented in Cuba by a single collection from Finca del Obispo, near Habana, León 1986, the specimen less pubescent than typical. Originally described from Mexico.

9. *Paspalum denticulatum* Trin. Gram. Pan. 111. 1826.

Paspalum lividum Trin.; Scheele, Linnaea 26: 383. 1854.

A tufted glabrous perennial; culms compressed, ascending from a decumbent base; blades flat, lax; racemes 3 to 5, subflexuous, approximate on the very slender axis, the rachis rather broad, the glabrous spikelets commonly lurid purplish, the glume and sterile lemma very thin.

Along ditches and in wet ground, southern United States to South America and in Cuba (vicinity of Habana). Originally described from South America; *P. lividum* described from Mexico.

10. *Paspalum notatum* Flüge, Monogr. Pasp. 106. 1810.

Paspalum taphrophyllum Steud. Syn. Pl. Glum. 1: 19. 1854.

Culms tufted, ascending from a short hard rhizome, forming tough mats, the leaves crowded at base, the blades flat, 5 to 8 mm. wide, often elongate; racemes 2, approximate, diverging, usually arcuate; spikelets solitary, ovate, 2.5 to 3 mm. long, the glume and sterile lemma papery, shining.

Mexico and the West Indies to South America; in the West Indies common on open slopes and pastures from sea level to 1,000 meters altitude. The spikelets are variable in size, sometimes 3.5 mm. long. Originally described from St. Thomas; *P. taphrophyllum* described from Martinique.

Cuba, Jamaica, Haiti, Porto Rico, Antigua, Guadeloupe, Martinique, and Grenada.

11. *Paspalum minus* Fourn. Mex. Pl. 2: 6. 1886.

Closely related to *P. notatum*, perhaps not specifically distinct; spikelets less than 2.5 mm. long, less shining; racemes more widely diverging, lower leaves often sparsely ciliate.

Open ground, southern Mexico and West Indies to Uruguay. Originally described from Mexico.

Cuba (Province of Pinar del Río and Isle of Pines), Jamaica (Bull Head Mountain), and Porto Rico (Trujillo Alto).

12. *Paspalum pumilum* Nees, Agrost. Bras. 52. 1829.

Resembling *P. notatum*, densely tufted, leafy at base, forming mats, the few slender culms ascending; sheaths and commonly the blades pubescent; racemes 2, approximate, arcuately divergent, the dull oval spikelets about 1.8 mm. long.

Moist savannas, Leeward Islands to Uruguay. Originally described from Brazil.

Dominica and Trinidad (Piarco Savanna).

13. *Paspalum serpentinum* Hochst.; Steud. Syn. Pl. Glum. 1: 22. 1854.

Densely tufted, with gray-villous foliage and slender erect culms 50 to 60 cm. tall, the long erect stiff blades drying involute; racemes a slightly divergent pair, the spikelets solitary, nearly orbicular, about 2.5 mm. long, golden brown, transversely marked with dark lines.

Wet, sandy savannas, Trinidad and Dutch Guiana. Originally described from the latter place and known only from the type collection until found in Trinidad (Piarco Savanna, Hitchcock 10337).

14. *Paspalum plicatulum* Michx. Fl. Bor. Amer. 1: 45. 1803.

Paspalum undulatum Poir. in Lam. Encycl. 5: 29. 1804.

Paspalum antillense Husn. Enum. Glum. 13. 1871.

A tufted suberect perennial, 0.5 to 1 meter tall, with compressed simple culms, linear blades 5 to 10 mm. wide, sometimes sparsely pilose, and few to several arcuate-spreading racemes, 4 to 8 cm. long, the spikelets in pairs, drab-

colored, drying brown, oval, about 2.5 mm. long, strongly plano-convex, the sterile lemma at maturity finely undulate inside the slightly raised margin; fruit dark brown, shining.

Open slopes, banks, and savannas, mostly moist soil, southeastern United States to Argentina; throughout the West Indies except Bermuda and the Bahamas. Originally described from Georgia and Florida; *Paspalum undulatum* described from Porto Rico, and *P. antillense* from Guadeloupe.

15. *Paspalum olivaceum* sp. nov.

A leafy annual, olivaceous when dry; culms glabrous, slightly fleshy, compressed-striate when dry, 40 to 60 cm. long, ascending from a decumbent base, often rooting at the lower nodes, finally bearing simple floriferous branches; sheaths loose, thin, compressed, glabrous; ligule membranaceous, erose, 1.5 to 2 mm. long; blades lax, erect, at least at the base, flat, or folded at base, commonly 10 to 15 cm. long, 6 to 10 mm. wide, usually pilose on the upper surface at base, otherwise glabrous; panicle short-exserted from the bladeless upper sheath, the slender subflexuous axis 4 to 7 mm. long; racemes 3 to 7, arcuate-spreading, 2 to 3.5 cm. long, the rachis scarcely 1 mm. wide, a few long hairs at the base; spikelets mostly in pairs, 2 mm. long, 1.5 mm. wide, obovate, strongly convex on the back; glume and sterile lemma equal, 5-nerved, thin and commonly torn, glabrous or the glume obscurely strigose, the lemma often minutely wrinkled inside the slightly raised margin; fruit dark brown, shining, obovate-hemispherical.

Type in U. S. National Herbarium, no. 559837, collected in the island of Guadeloupe, September 23, 1897, by Père Duss (no. 3915).

Paspalum olivaceum is one of the group of brown-fruited annuals to which *P. boschianum* belongs. Because of its wrinkled sterile lemma it looks like a small lax-leaved *P. plicatulum*, from which species it differs in its branching culms and smaller spikelets and in being an annual. No habitat is given on the labels of the specimens, but the species is, probably, like its allies, found along ditches and in wet clay ground. Guadeloupe, Martinique, and the Guianas.

16. *Paspalum wrightii* sp. nov.

A glabrous perennial, the culms 1.5 meters or more long, simple, decumbent or floating at the base, with rootlets at the distant nodes, lush, with loose overlapping sheaths, the upper sheaths close, elongate; ligule membranaceous, 1 mm. long; blades suberect, rather firm, 20 to 40 cm. long, about 5 mm. wide (the uppermost greatly reduced), involute toward the summit, scabrous on the margins and bearing a tuft of long hairs just back of the ligule; racemes 5 or 6, ascending, 4 to 6 cm. long, the common axis slender, 8 to 10 cm. long, not hairy in the axils or with one or two hairs only; rachis 1.5 mm. wide, glabrous, the margin minutely scabrous; spikelets in pairs, closely imbricate, 2.2 to 2.5 mm. long, about 1.4 mm. wide, elliptic to slightly obovate, glabrous, the glume and sterile lemma equal, thin, slightly and irregularly wrinkled, 3-nerved or with an additional obscure pair near the margin; fruit about 2.2 mm. long, 1.2 mm. wide, elliptic, chestnut-brown, the rolled margins of the lemma pale.

Type in the U. S. National Herbarium, no. 865562, collected in Cuba by Charles Wright (no. 3843).

Apparently an aquatic or semiaquatic and probably allied to *Paspalum plicatulum*. Known only from the type collection, on which is given no date and no locality other than Cuba. The floating habit is inferred from the texture of the lower part of the culm and its loose slightly inflated sheaths. In the

specimen of *Wright* 3843 in herbarium of the Academia de Ciencias de la Habana there is a small shoot from one of the submerged nodes, indicating a stoloniferous habit. This is the species doubtfully referred to *P. elatum* Rich. by Hitchcock¹ and described under that name by Nash.² *Paspalum elatum* is described as having spikelets twice as wide as the rachis and a first glume half as long as the spikelet on one of the pair. It must be, as Doell suggests, allied to *Panicum monostachyum* (*Paspalum pilosum*).

17. *Paspalum melanospermum* Desv. in Poir. in Lam. Encycl. Suppl. 4: 315. 1816.

An erect nearly glabrous annual, 30 to 40 cm. tall; culms compressed, branching, commonly purplish; sheaths thin, loose, with a hyaline shining golden brown margin; blades flat, lax with a very narrow pale shining margin; racemes 2 or 3, the lateral arcuate-spreading, about 2 cm. below the erect or curved terminal one; rachis about 1.5 mm. wide; spikelets solitary or paired, rusty drab, strongly plano-convex, broadly obovate, 2 to 2.2 mm. long, the glume and sterile lemma thin; fruit dark brown, shining.

Moist clay banks and slopes, Florida and the West Indies to Brazil. Originally described from Cayenne. North American specimens have been referred to *P. scrobiculatum* L., a species described from India. This is the species listed as *P. boscianum* Flügge by Nash in the Grasses of Porto Rico.³

Porto Rico (Monte Mesa, Monte Alegrillo, and Sierra de Luquillo).

18. *Paspalum convexum* Humb. & Bonpl. in Flügge, Monogr. Pasp. 175. 1810.

Paspalum hemicryptum Wright, Anal. Acad. Cienc. Habana 8: 204. 1871.

A tufted leafy annual, the spreading culms usually 20 to 30 cm. long, commonly bearing short flowering branches from all the upper nodes; blades flat, glabrous to conspicuously pilose; racemes mostly 2 to 4, short and thick, the heavy hemispheric spikelets 2.4 to 2.8 mm. long, the base of the short panicle often included. An exceedingly variable species; *Wright* 3847 from El Salado, Cuba, the type of *P. hemicryptum*, has pilose blades and spikelets 2.4 mm. long.

Open ground, fields, and waste places, Central Mexico to Costa Rica; also in Cuba (El Salado) and Trinidad (La Brea). *Paspalum convexum* was described from Mexico.

19. *Paspalum fimbriatum* H. B. K. Nov. Gen. & Sp. 1: 93. 1816.

An erect or ascending annual, 30 to 100 cm. tall, with ciliate sheaths, lax blades, and few to several ascending racemes, the imbricate spikelets with a broad flat lacerate corky wing margin ciliate on the edge.

Roadsides and waste places, West Indies and northern South America. Originally described from Colombia.

Bahamas (Andros, New Providence, Eleuthera), Jamaica, Porto Rico, St. Croix, Antigua, Montserrat, Dominica, Martinique, Guadeloupe, Barbados, and Trinidad.

20. *Paspalum neesii* Kunth, Rév. Gram. 1: 25. 1829.

Paspalum angustifolium Nees, Agrost. Bras. 64. 1829, not Le Conte, 1820, nor Nees, 1826.

* An erect tufted perennial with slender culms 40 to 100 cm. tall, linear elongate firm involute or folded blades, and a long-exserted inflorescence of 2 suberect racemes, 3 to 5 cm. long, the common axis about 1 cm. long; rachis very slender; spikelets solitary, elliptic, 4 to 4.5 mm. long, about 1.7 mm. wide.

¹ Contr. U. S. Nat. Herb. 12: 202. 1909.

² N. Amer. Fl. 17: 188. 1912.

³ Bull. Torrey Club 30: 376. 1903.

Pine land, Cuba (Province of Pinar del Río and Isle of Pines), Brazil, and Paraguay. Originally described from Brazil. This is the species listed as *P. lineare* Trin. by Hitchcock.¹ That is a coarser plant with larger spikelets, not known from the West Indies.

21. *Paspalum leptocaulon* Nash, N. Amer. Fl. 17: 181. 1912.

Plants in large dense tussocks, the very slender elongate blades and culms reclining, commonly 50 cm. long, sometimes longer, the solitary slender arcuate racemes 3 to 8 cm. long, the solitary glabrous ovate spikelets about 1.6 mm. long, the glume and sterile lemma scarcely or not at all inflated.

Open grass land in the Greater Antilles. Described from Lacovia, Jamaica, Britton 1475 being the type.

Cuba, Santo Domingo, and western Jamaica.

22. *Paspalum filiforme* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Paspalum swartzianum Flüggé, Monogr. Pasp. 96. 1810.

Paspalum lineare Swartz; Steud. Nom. Bot. ed. 2. 2: 272. 1841, as synonym of *P. swartzianum*.

Stouter than the preceding, the blades thicker, lunate in cross section; spikelets 2 mm. long, the glume and sterile lemma loose, wrinkled, the glume much inflated at maturity, the spikelets irregularly rhombic.

Open mostly dry or sterile slopes, Cuba and Jamaica. Originally described from Jamaica. Sometimes called "wiregrass."

23. *Paspalum lindenianum* A. Rich. in Sagra, Hist. Cuba 11: 299. 1850.

Paspalum longifolium Steud. Syn. Pl. Glum. 1: 21. 1854, not Roxb. 1820.

Paspalum megaphyllum Steud. Syn. Pl. Glum. 1: 464. 1854.

Stouter and on the average taller than nos. 21 and 22, the blades commonly equaling the long curved raceme; spikelets 3 mm. long, the glume and sterile lemma loose and wrinkled as in *P. filiforme*, pointed beyond the fruit.

Open slopes and rocky or dry savannas, Cuba and Jamaica. Described from Cuba, Linden 1813 being the type of *P. lindenianum* and of *P. longifolium*, *P. megaphyllum* being a change of name for the latter.

24. *Paspalum nanum* Wright; Griseb. Cat. Pl. Cub. 230. 1866.

Paspalum caudicatum Wright, Anal. Acad. Cienc. Habana 8: 205. 1871.

Tufted, erect, the sheaths and blades villous, the blades flat, 8 to 14 cm. long, 2.5 to 5 mm. wide, much shorter than the long slender culms; raceme 4 to 6 cm. long, the spikelets about 2.5 mm. long, the glume and sterile lemma loose and wrinkled.

Sandy savannas, central and western Cuba. The type locality of *P. nanum* is Hanábana and of *P. caudicatum*, Vuelta Abaja.

25. *Paspalum alterniflorum* A. Rich. in Sagra, Hist. Cuba 11: 299. 1850.

Paspalum dolichophyllum Hack. Inf. Est. Centr. Agron. Cuba 1: 409. 1906.

Densely tufted, erect, commonly 30 to 60 cm., sometimes 1 meter, tall; sheaths rather loose; blades involute, flexuous, mostly overtopping the erect, usually solitary racemes; spikelets narrowly ovate, about 2.5 mm. long, the glume and sterile lemma villous toward the base, equal, exceeding the fruit.

Moist savannas, central and western Cuba, whence originally described; the type of *P. dolichophyllum* also from Cuba, Baker & Zarragoitia 4545.

26. *Paspalum rottboellioides* Wright, Anal. Acad. Cienc. Habana 8: 204. 1871.

Culms tufted, slender, erect, 30 to 60 cm. tall; leaves mostly clustered at the base, the pilose linear blades about 2 mm. wide; racemes 1 or 2, 6 to 8 cm.

¹ Contr. U. S. Nat. Herb. 12: 203. 1909.

long, suberect, the common axis about 1.5 cm. long; spikelets solitary, often reddish, 3 mm. long, 1 mm. wide, oblong-elliptic, the glume pilose, the sterile lemma glabrous or pilose at the base.

Sandy savannas, Cuba (Vuelta Abaja and Isle of Pines), *Wright* 3864 from Vuelta Abaja being the type specimen.

27. *Paspalum rupestre* Trin. Linnaea 10: 293. 1836.

A low perennial with delicate simple naked culms arising from a tuft of ciliate subinvolute blades not over 2 mm. wide, commonly 3 to 5 mm. long; racemes commonly 1.5 to 2 cm. long, the oblong-oval glabrous spikelets 1 mm. long.

Open arid rocky slopes, Cuba (El Yunque) and Porto Rico (Monte Mesa). Originally described from a collection made by Poeppig in Cuba; apparently rare. *Wright*¹ gives Nees as the author of *P. rupestre*.

28. *Paspalum leoninum* Chase in Hitchc. Bot. Gaz. 51: 300. 1911.

Larger than the preceding, forming dense mats, the slender culms commonly 20 to 30 cm. long, reclining; blades 2 to 3 mm. wide, flat when fresh, conspicuously ciliate, often with a waxy luster, more or less involute in drying; racemes commonly 3 to 4 cm. long, the spikelets about 1.5 mm. long.

Open rocky slopes, mostly serpentine, Cuba (Guanabacoa, Campo Florido, and Sancti Spiritus) and Porto Rico (Monte Mesa, Monte Alegrillo, and Indiera Fria). Described from Cuba, *León* 950 being the type.

29. *Paspalum poiiretii* Roem. & Schult. Syst. Veg. 2: 878. 1817.

Paspalum gracile Poir. in Lam. Encycl. Suppl. 4: 313. 1816, not Rudge, 1805.

Plants caespitose, with tough matted roots; culms usually 15 to 40 cm. tall, simple or rarely branching, very slender but wiry, leaning or spreading, flattened, more or less twisted and tortuous, glabrous; nodes appressed-pubescent; leaves mostly crowded toward the base, the lower sheaths overlapping, the upper sheath remote, bladeless or nearly so; sheaths hirsute along the margin and at the summit, sometimes sparingly so throughout; ligule membranaceous, scarcely 0.5 mm. long; blades rather thick, 3 to 10 cm. long, 3 to 5 mm. wide, tapering to the base, usually flat when fresh, folded or involute in drying, more or less tortuous, sometimes conspicuously so, a few hairs about the ligule, otherwise glabrous, or sometimes sparsely pilose; inflorescence long-exserted, terminal on the culm or a leaf-bearing branch (not truly axillary); racemes commonly 1 (sometimes a second, 1 to 1.5 cm. distant), 2 to 4 cm. long, erect or falcate; rachis 1 mm. wide, glabrous or minutely strigose, bearing a few long hairs at the base; spikelets usually solitary but the second spikelet of the pair sometimes developed toward the summit of the raceme; pedicels about 0.8 mm. long, flattened, glabrous or nearly so; spikelets 1.3 to 1.5 mm. long, 1 to 1.1 mm. wide, oval, blunt; second glume and sterile lemma covering the fruit, 3-nerved, appressed-pubescent or the lemma sometimes glabrous; fruit pale.

Rocky, mostly limestone soil, the Greater Antilles. Originally described from Santo Domingo. This species is included in *P. rupestre* Trin. as listed by Hitchcock² and is the species described under that name by Nash.³ We have not seen the type of *P. gracile*, of which *P. poiiretii* is a change of name.

Cuba, Jamaica, Santo Domingo (Azua), and Porto Rico (Aguada and Lares).

30. *Paspalum capillifolium* Nash, N. Amer. Fl. 17: 181. 1912.

A low, densely tufted glabrous perennial with filiform culms and blades, the latter about 5 cm. long; raceme solitary, slender, 2 to 4 cm. long, the glabrous elliptic spikelets about 1.7 mm. long.

¹ Anal. Acad. Cienc. Habana 8: 202. 1871.

² Contr. U. S. Nat. Herb. 12: 206. 1909.

³ N. Amer. Fl. 17: 182. 1912.

Palm barren, Cuba. Known only from the type collection from Santa Clara, Britton & Wilson 6116.

31. *Paspalum breve* Chase in Hitchc. in Urban, Symb. Antill. 7: 166. 1912.

A low glabrous stoloniferous perennial forming dense mats, the subfiliform flat culms 5 to 8 cm., rarely 10 cm., tall, the numerous basal blades about 5 cm. long, 2 to 4 mm. wide, flat, somewhat involute in drying; racemes solitary, 10 to 12 cm. long, the imbricate, shining, broadly oval spikelets about 1.4 mm. long.

Stony slopes, Cuba (Province of Habana, whence originally described, León 1996 from Marianao being the type), and Sancti Spiritus.

32. *Paspalum caespitosum* Flügge, Monogr. Pasp. 161. 1810.

Paspalum heterophyllum Desv.; Poir. in Lam. Encycl. Suppl. 4: 315. 1816.

Paspalum lanceaefolium Desv. Opusc. 58. 1831.

Densely caespitose, the slender culms commonly 30 to 60 cm. tall, with a hardened slightly enlarged base; blades commonly 10 to 20 cm. long and 4 to 7 mm. wide, often bluish, rather firm, flat, usually somewhat involute in drying; racemes mostly 3 to 5, remote, ascending, commonly 2 to 3 cm. long, the crowded obovate spikelets about 1.6 mm. long, in pairs, mostly pale with green nerves, minutely pubescent. The blades are variable in size and shape, usually but not always narrowed at the base.

Limestone cliffs and slopes, mostly near the coast, Florida, Bahamas, and the Greater Antilles. *Paspalum caespitosum* and *P. heterophyllum* were described from Santo Domingo. *Paspalum lanceaefolium* is a second name for *P. heterophyllum*.

Bahamas (Andros and Great Exuma), Cuba, Jamaica, Santo Domingo, and Porto Rico.

33. *Paspalum portoricense* Nash, Bull. Torrey Club 30: 377. 1903.

Tufted, usually olivaceous, the slender culms spreading, 25 to 40 cm. long; blades rather thin, flat, commonly 5 to 10 cm. long, 4 to 5 mm. wide (rarely narrower and involute); racemes 2 or 3, remote, slender, laxly arcuate-ascending, 4 to 6 mm. long; spikelets elliptic, about 1.7 mm. long and 0.8 mm. wide, subacute, minutely appressed-pubescent, in pairs, not crowded.

Open hilltops and slopes, mostly in red clay, Bahamas (Crooked Island) and Porto Rico (not infrequent). Originally described from Porto Rico, Heller 524, collected between Aibonito and Cayey, being the type. This may be *Paspalum richardii* Steud.¹, the description of which, from "ins. Antillae," well applies to this species.

34. *Paspalum simpsoni* Nash, Bull. Torrey Club 24: 39. 1897.

Glabrous; culms commonly 0.5 to 1 meter tall, slender, erect or ascending, a leafless flowering branch sometimes borne at the upper node, otherwise simple; blades flat, firm, 5 to 15 cm. long, rarely longer, 5 to 10 mm. wide; racemes few to several, arcuate-spreading, remote on a very slender axis, the minute obovate glandular-pubescent spikelets in pairs, crowded.

Open or brushy limestone soil, southern Florida, the Bahamas, and the Greater Antilles. Originally described from Florida.

Bahamas (Great Bahama, Andros, Nassau, New Providence, Watling Island, Inagua), Cuba (on the south coast), Jamaica, and Porto Rico.

35. *Paspalum glabrum* Poir. in Lam. Encycl. 5: 30. 1804.

Paspalum milioides Desv.; Poir. in Lam. Encycl. Suppl. 4: 315. 1816.

Paspalum miliare Spreng. Syst. Veg. 1: 247. 1825.

Paspalum helleri Nash, Bull. Torrey Club 30: 376. 1903.

¹ Syn. Pl. Glum. 1: 17. 1854.

In small tufts, glabrous as a whole, the slender culms often 1 meter tall, ascending, simple, the long rather stiff blades folded or involute toward the apex, scabrous on the margin, and with a few long white hairs above the ligule; racemes few to several, rather distant, 5 to 10 cm. long, mostly arcuate-divaricate, the crowded spikelets 1.8 to 2 mm. long, obovate-oval, pubescent, or rarely glabrous.

Mostly in partially shaded limestone soil, Florida and the West Indies. Poiret's description is insufficient for identification, but Mr. Nash, who has examined the specimen, notes, comparing it with *Heller* 10, the type of *P. helleri*, that the "type of *P. glabrum* Poir. is a more slender plant with smaller glabrous spikelets." This, the typical but less common form, is represented by *Britton & Brace* 404, from the Bahamas, and by *Chase* 6408, 6423, 6618, from Porto Rico. It differs only in having glabrous spikelets. In *Heller* 10 the spikelets are 2 mm. long, but in many specimens having pubescent spikelets the spikelets are but 1.8 mm. long, as in the plants with glabrous spikelets just mentioned, while in *Chase* 6499, from Porto Rico, the glabrous spikelets are 2 mm. long. In *Hitchcock* 9674, from Jamaica, the spikelets are 2 mm. long, most of them wholly glabrous, but a few pubescent on the convex side as in the type of *P. helleri*. No other character can be found to differentiate the specimens with pubescent from those with glabrous spikelets. The type specimens of all the names given are from Porto Rico.

Bahamas (New Providence, Nassau, Andros, Fortune Island, and Inagua), Cuba, Santo Domingo, Jamaica (Montego Bay), Porto Rico (common throughout, a characteristic plant of cocoanut groves), St. Thomas, St. Croix, Anagada, Tortola, St. Jan, Dominica, Martinique, Grenada, and Barbados.

36. *Paspalum bakeri* Hack. Inf. Est. Centr. Agron. Cuba 1: 410. 1906.

A glabrous tufted perennial, the flattened culms widely spreading, 20 to 45 cm. long, finally branching, the stiff divergent, rather short blades involute-pointed; racemes 2 or 3, suberect, 2 to 6 cm. long, 1 to 1.5 cm. distant, the pale glabrous spikelets in pairs, narrowly obovate, 2 mm. long.

Near the seashore, Province of Habana, Cuba, whence described (*Baker* 1824 being the type), and Isle of Pines.

37. *Paspalum rigidifolium* Nash, Bull. N. Y. Bot. Gard. 1: 292. 1899.

Perennial, the slender culms stiffly erect, the linear glabrous blades mostly aggregated toward the base, a prominent tuft of hairs borne just above the ligule.

Sandy open woods and savannas, Florida to Mississippi and in the Province of Pinar del Río (Chirigote), Cuba. Originally described from Florida.

38. *Paspalum propinquum* Nash, Bull. N. Y. Bot. Gard. 1: 291. 1899.

Tufted, the slender culms spreading or ascending, the flat thin but firm blades usually 5 to 6 mm. wide, strongly ciliate, otherwise glabrous or nearly so; racemes 1 or, on the terminal peduncle, sometimes 2, the pale, minutely pubescent or glabrous spikelets about 1.8 mm. long.

Open ground, fields and pastures, southeastern United States and the West Indies. Originally described from Florida. Grisebach¹ refers this species to *P. setaceum* Michx.

Bermuda, Cuba (Habana), Jamaica, and Porto Rico.

39. *Paspalum ciliatifolium* Michx. Fl. Bor. Amer. 1: 44. 1803.

Closely related to the preceding, the blades more lax, commonly wider.

¹ Fl. Brit. W. Ind. 542. 1864.

Central and eastern United States and Province of Habana, Cuba. Originally described from Carolina.

40. *Paspalum debile* Michx. Fl. Bor. Amer. 1: 44. 1803.

Perennial, with a cluster of short leafy shoots at base, the blades flat, rather thin, pilose on both surfaces, conspicuously ciliate; culms slender, ascending; racemes 4 to 6 cm. long, usually 2 on the terminal culm, solitary on the axillary peduncles, the pale, minutely pubescent, broadly ovate spikelets 1.6 to 1.8 mm. long.

Open savannas and slopes, southeastern United States and in Cuba (Herradura, Hitchcock 471), the Cuba specimens less strongly pubescent than typical. Originally described from the Carolinas and Georgia.

A specimen collected in Inagua, Bahamas, in 1890, by A. S. Hitchcock is allied to the preceding, but at present we are unable to refer it to any known species. It seems to be nearest to *P. psammophilum* Nash, of the Middle Atlantic States, but the spikelets are narrower than in that species and the plant much smaller.

41. *Paspalum decumbens* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.¹

Paspalum pedunculatum Desv.; Poir. in Lam. Encycl. Suppl. 4: 315. 1816.

Panicum decumbens Roem. & Schult. Syst. Veg. 2: 429. 1817.

Paspalum vaginiflorum Steud. Syn. Pl. Glum. 1: 19. 1854.

Dimorphostachys pedunculata Fourn. Mex. Pl. 2: 15. 1886.

A freely branching decumbent perennial with slender compressed culms, velvety foliage, the flat blades 5 to 10 cm. long, 5 to 8 mm. wide, and solitary arcuate racemes usually 2 to 3 cm. long, borne on very slender peduncles, these commonly several from the upper sheaths; spikelets obovate, 1.5 mm. long, a small first glume present, the second glume about half the length of the fruit.

Shaded banks and wooded slopes, Central America and the West Indies and northern South America. *Paspalum decumbens* was described from Jamaica; *P. pedunculatum* and *P. vaginiflorum* from French Guiana.

Cuba (Province of Pinar del Río and Isle of Pines), Haiti, Jamaica, Porto Rico, and Trinidad.

42. *Paspalum nutans* Lam. Tabl. Encycl. 1: 175. 1791.

Paspalum lloydii Nash, N. Amer. Fl. 17: 178. 1912.

Resembling the preceding, the culms longer, the foliage not velvety, the racemes sometimes 2 or 3, the spikelets 1.8 mm. long, the first glume wanting, the second nearly as long as the fruit.

Shady banks and a weed in fields, Costa Rica and the Lesser Antilles to South America. Originally described from Central America; *P. lloydii* described from Dominica, Lloyd 590 being the type.

Guadeloupe, Dominica, Grenada, and Trinidad.

43. *Paspalum ciliiferum* (Nash) Hitchc. Contr. U. S. Nat. Herb. 12: 201. 1909.

Dimorphostachys ciliifera Nash in Small, Fl. Southeast. U. S. 78. 1903.

Tufted, the slender culms spreading or ascending; blades sparsely pubescent, rather thin, flat, usually 10 to 15 cm. long, 8 to 10 mm. wide; racemes 1 or 2, slightly curved, 5 to 10 cm. long, usually with a tuft of long white hairs at the base; spikelets about 2.8 mm. long, narrowly obovate, appressed-pubescent, the first glume truncate on the primary, acuminate on the secondary, spikelet.

Thickets and shaded banks, Florida and Cuba. Originally described from Florida.

44. *Paspalum paniculatum* L. Syst. Nat. ed. 10. 2: 855. 1759.

Paspalum hemisphericum Poir. in Lam. Encycl. 5: 31. 1804.

¹ *Paspalum decumbens* Rottb. 1778 is a nomen nudum.

Panicum paniculatum Kuntze, Rev. Gen. Pl. 3¹: 363. 1898.

Paspalum paniculatum minor Scribn. in Millsp. Field Mus. Bot. 2: 24. 1900.

A weedy branching perennial, commonly a meter or more tall, the foliage harshly pubescent, the flat blades 20 to 30 cm. long, about 1.5 cm. wide; racemes very numerous, slender, crowded in an oblong panicle, the minute crowded sub-hemispheric spikelets pubescent. Exceedingly variable in size and in the amount of pubescence.

Savannas, open or partly shaded, mostly moist ground, Mexico and the West Indies to South America; common throughout the West Indies. Originally described from Jamaica, the variety also described from that island; *P. hemisphericum* described from Porto Rico.

45. *Paspalum multicaule* Poir. in Lam. Encycl. Suppl. 4: 309. 1816.

Paspalum papillosum Spreng. Nov. Prov. Hal. 47. 1819.

A low annual, profusely branching from the base and lower nodes, the sheaths and narrow linear blades pilose; racemes a pair at the summit of the culm (rarely solitary), divergent, slender, about 3 cm. long, the minute pale orbicular spikelets irregularly sprinkled with globular hairs, these often wanting on some of the spikelets but present on some on each plant.

Moist savannas and open ground, Cuba (Province of Pinar del Río), Trinidad, Brazil, and Bolivia. Both *P. multicaule* and *P. papillosum* originally described from Brazil.

46. *Paspalum parviflorum* Rhode; Flügge, Monogr. Pasp. 98. 1810.

A low annual with delicate, repeatedly branching culms, the sheaths and flat linear blades pilose with long spreading hairs; racemes 2 or 3, about 5 mm. distant, divergent, 10 to 18 mm. long, pilose in the axils, the very minute glabrous spikelets solitary.

Apparently a plant of open moist sand, described from Porto Rico but not since collected in any of the West Indies, our specimens being from Guiana and Brazil.

47. *Paspalum clavuliferum* Wright, Anal. Acad. Cienc. Habana 8: 203. 1871.

Perennial in small tufts with very slender, sparingly branching culms 25 to 40 cm. tall, pubescent flat linear erect blades, and a pair of slender arcuate racemes (sometimes a single one) 3 to 5 cm. long, the paired obovate, minutely pubescent spikelets 1.5 mm. long.

Open wet ground, Cuba (Zaza de Tunas and Cajalbana), Porto Rico (Campo Alegre, *Stevenson* 2454), and southern Mexico to South America. Originally described from Cuba, *Wright* 3444¹ being the type.

48. *Paspalum orbiculatum* Poir. in Lam. Encycl. 5: 32. 1804.

Paspalum pusillum Vent.; Flügge, Monogr. Pasp. 100. 1810.

Paspalum lenormandi Husn. Enum. Glum. 12. 1871.

A glabrous creeping perennial with ascending flowering branches 10 to 20 cm. tall, the delicate culms finally branching; blades flat, spreading, mostly 1.5 to 4 cm. long, 4 to 7 mm. wide; racemes 2 or 3, short-exserted, 4 to 5 mm. distant, 1 to 2 cm. long, the minute glabrous pale yellow suborbicular spikelets singly disposed.

Wet places, southern Mexico and the West Indies to South America. Originally described from Porto Rico; *P. pusillum* described from St. Thomas, and *P. lenormandi* from Martinique.

Haiti, Porto Rico, Dominica, Martinique, and Trinidad.

¹ Two other species, *P. caespitosum* and *P. poiretii*, were also distributed under this number.

49. *Paspalum reptatum* sp. nov.

Perennial, cespitose; culms compressed, creeping, as much as 1 meter long, rooting at the nodes, bearing erect or ascending leafy, often fascicled branches, 10 to 30 cm. long; sheaths compressed, the lower mostly velvety-pubescent, the upper usually glabrous except for a puberulent band at the summit, this sometimes wanting, commonly loose and separating from the culm; ligule minute, membranaceous; blades flat, spreading, 3 to 10 cm. long, 2 to 5 mm. wide, rounded at the base, velvety-pubescent to glabrous; racemes 2 or 3, commonly overtopped by the upper leaf, 5 to 10 mm. apart on a slender flattened glabrous axis, divergent or somewhat reflexed, 1 to 3.5 cm. long; rachis pubescent at the naked base, otherwise glabrous, the midnerve raised into a prominent ridge between the two rows of spikelets; spikelets solitary, not imbricate, yellowish green, blotched with brown, pubescent, 1.5 to 1.7 mm. long, 1.2 mm. wide, obovate, blunt, the glumes and sterile lemma equal; fruit stramineous, very minutely roughened.

Type in the U. S. National Herbarium, no. 865563, collected in wet ground in savannas west of Manacas, Province of Santa Clara, Cuba, by Brother León and F. R. Cazanás, December 28, 1915 (no. 5850). Known only from the type collection.

This species is most nearly related to *Paspalum orbiculatum*, from which it is distinguished by its larger pubescent spikelets, as well as by its larger size, more or less pubescent foliage, and longer narrower blades.

50. *Paspalum conjugatum* Bergius, Act. Helv. Phys. Math. 7: 129. 1762.

An extensively creeping perennial with compressed culms, the suberect flowering branches sometimes 1 meter tall; blades flat, rather thin, up to 20 cm. long, commonly about 8 mm. wide; racemes a pair (rarely a third below), widely divaricate, usually arcuate, slender, commonly 10 to 12 cm. long, the pale yellow flattened imbricate spikelets about 1.5 mm. long, with scant long silky hairs around the margin.

Moist ground, Gulf States to South America; Tropics and Subtropics of both hemispheres; throughout the West Indies; one of the commonest grasses of moist savannas and ditch banks, forming extensive and close mats. Originally described from Dutch Guiana. This species is said by C. F. Baker and by Père Duss to be an excellent forage grass. Maza and Roig¹ state that it is eaten by cattle only when they are driven to it by hunger. The common name "sour-grass," given to this species by Grisebach, would indicate that it was unpalatable. In Cuba it is called "cañamazo" and "cañamazo hembro."

50a. *Paspalum conjugatum pubescens* Doell in Mart. Fl. Bras. 2³: 55. 1877.

On the average coarser than the preceding, the blades somewhat firmer, pubescent; spikelets 2 mm. long, the silky hairs more copious.

Moist savannas and banks, South America. In the West Indies found in Grenada only (*Broadway* in 1904). Originally described from Brazil.

PASPALUM DILATATUM Poir. In the herbarium of the New York Botanical Garden there is a specimen of this species from "lawn, Agr. Sta.," Bermuda (*Brown, Britton & Bisset* 2005). This is a tall grass with flat ovate ciliate spikelets, often cultivated in the Subtropics under the name of "water-grass."

51. *Paspalum fasciculatum* Willd. in Flügge, Monogr. Pasp. 69. 1810.

A large, extensively creeping perennial, the compressed culms as much as 1 cm. wide and several meters long, the bases forming a tangled mass, the erect flowering culms 1 to 2 meters tall; sheaths densely silky-ciliate, at least

¹ Est. Exp. Agron. Bol. 22: 57. 1914.

toward the summit; blades flat, 30 to 60 cm. long, commonly 2 cm. wide, the margins very scabrous; racemes 10 to 12 cm. long, numerous, aggregated in a fan-shaped panicle; spikelets 4 mm. long, 1.5 mm. wide, acuminate.

Stream banks and swamps, southern Mexico, Trinidad (St. Joseph), and Tobago to South America. Originally described from Brazil.

52. *Paspalum virgatum* L. Syst. Nat. ed. 10. 2: 855. 1759.

Paspalum leucocheilum Wright, Anal. Acad. Cienc. Habana 8: 203. 1871.

Paspalum virgatum var. *jacquinianum* Flügge, Monogr. Pasp. 190. 1810.

A robust perennial growing in large clumps, the erect culms commonly 2 meters tall, the lower sheaths nodulose in drying; blades commonly 50 cm. or more long, 1 to 2 cm. wide, flat, the margins very scabrous; racemes several to many, 5 to 12 cm. long, forming a panicle 20 to 40 cm. long, a tuft of long hairs in the axils, the dull purplish rachises often sparsely ciliate with long hairs; spikelets in pairs, crowded, grayish, becoming rusty brown at maturity, obovate, 3 mm. long, 2 mm. wide, silky-hairy around the margin of the glume and the summit of the sterile lemma. In Porto Rico this and other species of this group are called "cortedero" because of the cruel cutting edges of the blades.

Banks and slopes, mostly moist and swampy ground, Mexico and the West Indies to Argentina. Originally described from Jamaica. *Paspalum leucocheilum* was described from the Isle of Pines; *P. virgatum* var. *jacquinianum* from Caribbean islands. Throughout Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, Trinidad, and Tobago, and represented by specimens from Dominica, Martinique, St. Lucia, Grenada, and Barbados. Called "caguazo" in Cuba.

53. *Paspalum secans* sp. nov.

Perennial, glabrous, in large clumps, with numerous long-leaved sterile shoots, the strong erect simple culms commonly 1 to nearly 2 meters tall; sheaths mostly overlapping, commonly separating from the culm and becoming involute above, ciliate at the summit, the lower rather loose and papery; ligule about 1.5 mm. long, membranaceous, with a dense row of white hairs behind it; blades erect, as much as 1 meter long, firm, 5 to 10 mm. wide, tapering to a base narrower than the summit of the sheath, long-acuminate, flat but drying more or less involute, the margins very sharply serrulate; racemes 5 to 12 (rarely as many as 20), relatively slender, sometimes flexuous, spreading, 6 to 15 mm. long, pilose at the base, rather remote, the panicle loose and open; spikelets glabrous, mostly pale, in pairs, not so crowded as in *P. virgatum*, glabrous, 2.3 to 2.7 mm. long, 1.5 to 1.6 mm. wide, obovate-elliptic; fruit about 2.3 mm. long, pale, minutely roughened.

Type in the U. S. National Herbarium, no. 732740, collected on Monte Mesa, Porto Rico, October 17, 1913, by Agnes Chase (no. 6174). The name refers to the sharp-cutting leaf blades.

Open slopes and dryish savannas, affecting drier situations than the other allies of *P. virgatum*.

Most of the Cuba and Jamaica specimens are somewhat more robust, with racemes on the average more numerous (12 to 15), the spikelets slightly wider. This Jamaican form, together with a yellow-panicked form of *P. virgatum*, Grisebach¹ described as *P. virgatum* var. *stramineum*, differentiating it by "axis half as broad as the spikelets; glumes straw-colored or at length purplish-tawny, usually glabrous," and citing March, Jamaica, and Wulfschlaegel, Antigua, and also referring to Trinius, Icones, plate 131. The March specimen in the Grisebach Herbarium is the form with glabrous spikelets and pale fruit, the Wulfschlaegel specimen is *P. virgatum*. Trinius's plate 131 shows pubescent spike-

¹ Fl. Brit. W. Ind. 543. 1864.

lets and the description states that the fruit is dark, both these characters indicating *P. virgatum*. In any case Grisebach's varietal name would be, because of *P. stramineum* Nash, untenable for a species. *Paspalum secans* is based on the Porto Rico collections; the Jamaica form may possibly be distinct.

Hitchcock¹ refers this species to *P. virgatum schreberianum* Flügge, described from South America, and Nash² to *P. schreberianum*. We have not seen Flügge's specimen, but his description, "spikes about thirty, the rachis margin subpilose, spikelets glabrous," applies to our species only in the last character. Furthermore *P. secans* is not known from the continent, but from the West Indies only.

Bahamas (Inagua, New Providence), Cuba, Jamaica, Porto Rico (frequent throughout), St. Croix, and Antigua.

54. *Paspalum millegrana* Schrad. in Schult. Mant. 2: 175. 1824.

Paspalum underwoodii Nash, Bull. Torrey Club 30: 375. 1903.

In large strong-rooted clumps, commonly 1.5 meters tall; lower sheaths nodulose, much overlapping; blades partially conduplicate, narrower, stiffer, and more scabrous than those of *P. virgatum*, often finely pubescent on the upper surface; racemes usually numerous, rather aggregated, ascending, the glabrous paired crowded spikelets usually glaucous-purplish or lead color, 2 to 2.2 mm. long, obovate-suborbicular, sometimes almost obcordate and apiculate.

Open mostly moist grounds, Bahamas and the Greater Antilles to southern Brazil. Originally described from Brazil. The type specimen has not been examined, but this is the only Brazilian species known to us answering the description, the characters "obovate-orbicular, glabrous, densely imbricate" applying particularly well to the spikelets of this species. *Paspalum underwoodii* was described from Porto Rico, *Underwood & Griggs* 149 being the type.

Bahamas (New Providence), Cuba, Jamaica, Porto Rico (common throughout), Trinidad, and Tobago.

55. *Paspalum densum* Poir. in Lam. Encycl. 5: 32. 1804.

Like *Paspalum millegrana* in habit, the culms and sheaths more lush and in drying more strongly nodulose; racemes 4 to 6 cm. long, very numerous, aggregated into an elongate-pyramidal panicle, the rachises conspicuously pilose, the light brown, glabrous, densely crowded spikelets 1.8 to 2 mm. long, nearly as broad.

Wet savannas and open wet ground, West Indies, Panama, and Venezuela. Originally described from Porto Rico.

Cuba (Pinar del Río, and Hanámana), Jamaica (parishes of Clarendon and St. Catherine), Porto Rico (south and west of San Juan Bay), Guadeloupe, and western Trinidad.

56. *Paspalum coryphaeum* Trin. Gram. Pan. 114. 1826.

An erect branching nearly glabrous perennial, 1 to 2 meters tall, the long flat blades purplish-glaucous, especially beneath; racemes numerous, ascending or finally arching, 5 to 10 cm. long, somewhat aggregated; rachis very slender with a long tuft of hairs at the base, the light brown elliptic crowded spikelets about 2 mm. long, the glume villous, the sterile lemma glabrous or obscurely pubescent toward the apex; panicles of the branches much smaller than the primary ones.

Savannas, western Trinidad to Brazil. Originally described from Brazil.

¹ Contr. U. S. Nat. Herb. 12: 206. 1909.

² Fl. N. Amer. 17: 190. 1912.

57. *Paspalum unispicatum* (Scribn. & Merr.) Nash, N. Amer. Fl. 17: 193. 1912.
Panicum (*Dimorphostachys*) *unispicatum* Scribn. & Merr. U. S. Dept. Agr.
 Div. Agrost. Bull. 24: 14. 1901.

Perennial from hard scaly rhizomes, the ascending, sparingly branching culms 18 to 45 cm. tall; blades flat, 8 to 25 cm. long, 6 to 8 mm. wide, pilose on the upper surface at the base and commonly with a few scattered hairs near the margin; racemes 1 or 2, erect or suberect, 5 to 9 cm. long, the rachis 1 mm. wide; spikelets in pairs, closely imbricate, pale greenish stramineous, glabrous, obovate, subacute, 2.6 to 3 mm. long, 1.5 mm. wide; first glume of the upper pair of spikelets flat, nerveless or faintly nerved, one-third to two-thirds as long as the spikelet, that of the lower carinate, two-thirds to three-fourths as long as the spikelet.

Open slopes and dry ground, southern Texas and Cuba (valley of the Río Zaza and near Habana) to Venezuela. Originally described from Oaxaca.

58. *Paspalum pilosum* Lam. Tabl. Encycl. 1: 175. 1791.

Panicum monostachyum H. B. K. Nov. Gen. & Sp. 1: 96. 1816.

Similar to the preceding, stoloniferous rather than rhizomatous, the culms more compressed, the foliage harshly pubescent; racemes solitary, commonly 10 to 15 cm. long, erect-arcuate, the rachis rarely sparsely pilose; spikelets blunter, the first glume usually less developed.

Savannas and dryish open ground, Costa Rica to Trinidad and Brazil. Originally described from tropical America; *Panicum monostachyum* described from Venezuela. The name *P. pilosum* is here tentatively applied. It may belong to *Panicum monobotrys* Trin., in which the rachis is more frequently pilose.

59. *Paspalum pulchellum* Kunth, Mém. Mus. Par. 2: 68. 1815.

Reimaria elegans Humb. & Bonpl.; Flüge, Monogr. Pasp. 216. 1810, not *Paspalum elegans* Flüge, op. cit. 183.

Perennial, in dense tufts, the slender simple culms 30 to 75 cm. tall, the pilose linear subinvolute blades clustered at the base, the culm sheaths bladeless or nearly so; racemes 2 or 3, approximate, spreading, 2 to 6 cm. long, the solitary glabrous oval spikelets about 1.8 mm. long; both glumes wanting, the sterile lemma tinged with red, sometimes dark crimson; fruit pale, smooth and shining.

Savannas, West Indies and northern South America. Originally described from Venezuela, the two names given above based on the same collection.

Cuba, Santo Domingo, and Trinidad.

60. *Paspalum saccharoides* Nees in Trin. Gram. Icon. 1: pl. 107. 1828.

Saccharum polystachyum Swartz, Prodr. Veg. Ind. Occ. 21. 1788, not *Paspalum polystachyum* R. Br. 1810.

Panicum saccharoides Kunth, Rév. Gram. 1: 237. pl. 30. 1830.

Moenchia speciosa Wender.; Steud. Nom. Bot. ed. 2. 2: 153. 1841.

Tricholaena saccharoides Griseb. Syst. Unt. Veg. Karaib. 117. 1857.

Syllepis polystachya Fourn. in Hack. in Mart. Fl. Bras. 2^a: 251. 1883, as synonym of *Imperata caudata*; Fourn. Mex. Pl. 2: 52. 1886, the name based on *Saccharum polystachyum* Swartz, but misapplied to a species of *Imperata*.

Paspalum polystachyum Kuntze, Rev. Gen. Pl. 2: 786. 1891, not R. Br. 1810.

A robust tufted stoloniferous perennial, the branching culms often 2 meters tall, the overlapping sheaths ciliate, the long flat blades 1 to 1.5 cm. wide, involute toward the apex, pale and appressed-pubescent on the upper surface; racemes numerous, commonly 15 cm. or more long, slender, drooping, forming

a feathery panicle, the small narrow spikelets margined with silky white hairs 6 to 8 mm. long, the general appearance unlike that of any other species of *Paspalum*.

Banks and steep slopes, Costa Rica and the Lesser Antilles to northern South America. Originally described from St. Christopher. *Paspalum saccharoides* was described from the West Indies. *Moenchia speciosa* was based on *Panicum saccharoides*.

Guadeloupe, Dominica, Martinique, Grenada, Trinidad, and Tobago.

36. PANICUM L.

Inflorescence paniculate (rarely racemose); spikelets pedicellate, biconvex; first glume present; sterile lemma usually inclosing a hyaline palea, sometimes a staminate flower; fruit chartaceous-indurate, the margins of the lemma in-rolled.

The North American species of this genus have been described in two earlier papers¹ in which a detailed citation of specimens is given. In the present paper there is given only a résumé collated from these two papers.

Axis of branchlets produced beyond the base of the uppermost spikelet as a point or bristle 1 to 6 mm. long. (Subgenus *PAUROCHAETIUM*.)

First glume rounded or truncate; second glume about as long as fruit.

3. *P. chapmani*.

First glume acute; second glume about two-thirds as long as fruit.

Spikelets 1.5 mm. long; blades involute-----1. *P. distantiflorum*.

Spikelets 2 mm. long; blades flat-----2. *P. utowanaeum*.

Axis of branchlets not produced into a bristle. (In *P. geminatum* the somewhat flattened axis pointed but not bristle-form.)

Basal leaves usually distinctly different from those of the culm, forming a winter rosette; culms at first simple, the spikelets of the primary panicle not perfecting seed, later usually becoming much branched, the small secondary panicles with cleistogamous fruitful spikelets. Mostly delicate grasses with small open primary panicles (narrow in *P. neuranthum* and *P. caerulea*), the small elliptical or obovate, obtuse spikelets (pointed in *P. fusiforme*) on capillary, often flexuous pedicels. (Subgenus *DICHANTHELIUM*.)

Foliage soft and lax, the flat blades prominently ciliate; plants branching from the base, finally forming rosettes or cushions. (*LAXIFLORA*.)

Spikelets papillose-pilose; sheaths retrorsely pilose----50. *P. xalapense*.

Spikelets glabrous; sheaths not retrorsely pilose.

Blades glabrous on the surface-----51. *P. polycaulon*.

Blades pilose on the surface-----52. *P. strigosum*.

Foliage not soft and lax; plants branching from the culm nodes.

Spikelets glabrous; plants glabrous throughout; autumnal phase erect, not bushy-branching. (*DICHOTOMA* in part.)

Plants delicate, tufted, not over 25 cm. tall; spikelets 1.2 mm. long.

67. *P. chamaelonche*.

Plants slender but not delicate, usually at least 50 cm. tall; spikelets 1.6 mm. long or more.

Spikelets not over 1.6 mm. long; panicles narrow; plants glaucous bluish green-----60. *P. caerulea*.

Spikelets 2 mm. or more long; panicles open----60. *P. roanokense*.

¹ Contr. U. S. Nat. Herb. 15: 1910; 17: 459-539. 1915.

Spikelets pubescent.

Spikelets attenuate at base, mostly prominently pustulose; blades narrow, stiff, strongly nerved, tapering from base to apex. (ANGUSTIFOLIA.)

Nodes bearded; plants grayish-villous; autumnal blades flat, rather soft -----54. *P. chrysopsidifolium*.

Nodes not bearded; plants villous only at base, or nearly glabrous; autumnal blades involute.

Spikelets 3 to 3.5 mm. long, pointed-----55. *P. fusiforme*.

Spikelets less than 3 mm. long, not pointed or obscurely so.

Plants glabrous or nearly so; autumnal culms erect; spikelets subsecund along the suberect panicle branches.

57. *P. neuranthum*.

Plants pubescent, at least on the lower half.

Spikelets not over 2 mm. long; vernal blades 4 to 6 cm. long; autumnal blades much crowded, falcate--53. *P. aciculare*.

Spikelets 2.2 to 2.4 mm. long; vernal blades 7 to 12 cm. long; autumnal blades not falcate-----56. *P. arenicoloides*.

Spikelets not attenuate at base, not pustulose; blades lanceolate to linear-lanceolate but usually less than 10 times as long as broad.

Sheaths glabrous.

Spikelets subglobose or pyriform.

Blades erect, 7 to 13 cm. long, 7 to 14 mm. wide; spikelets spheroid -----65. *P. erectifolium*.

Blades spreading, rarely over 5 cm. long and 5 mm. wide; spikelets pyriform; autumnal form bushy-branching. (LAN-
CEARIA.)

Spikelets 1.5 to 1.6 mm. long-----68. *P. portoricense*.

Spikelets 2 mm. long-----69. *P. lancearium*.

Spikelets elliptic to obovate.

Nodes glabrous.

Spikelets 2.8 to 3 mm. long; blades commonly 1 cm. wide, not white-margined -----72. *P. jorii*.

Spikelets not over 1.5 mm. long; blades not over 6 mm. wide, with a cartilaginous white margin.

66. *P. albomarginatum*.

Nodes bearded; blades not white-margined; spikelets 2 mm. long.

Sheaths, at least the upper, viscid-spotted; autumnal phase erect or reclining-----58. *P. nitidum*.

Sheaths not viscid-spotted; autumnal phase decumbent, with flabellate-fascicled branches-----59. *P. multirameum*.

Sheaths pubescent.

Culms usually 75 cm. or more tall; foliage velvety-pubescent.

Vernal culms erect or ascending; plants velvety throughout; spikelets about 2.5 mm. long-----70. *P. scoparium*.

Vernal culms decumbent at base; upper sheaths more or less glabrate; spikelets less than 2 mm. long--71. *P. viscidellum*.

Culms not over 50 cm. tall.

Plants conspicuously villous throughout----64. *P. acuminatum*.

Plants appressed-pubescent on the culms and sheaths; blades glabrous above.

Spikelets 1.2 to 1.3 mm. long-----62. *P. leucothrix*.

Spikelets not over 1 mm. long-----63. *P. wrightianum*.

Basal leaves similar to culm leaves, not forming a winter rosette; spikelets all fertile.

Spikelets plano-gibbous, the second glume swollen, bristly and burlike at maturity; first glume nearly as long as the minute spikelet; Trinidad.

75. *P. hirtum*.

Spikelets not plano-gibbous nor burlike.

Fruit transversely rugose.

Plants perennial.

Spikelets relatively long-pediceled in a large open panicle.

20. *P. maximum*.

Spikelets sessile along the racemes or raceme-like branches of the panicle.

Nodes bearded; inflorescence of numerous long subfasciculate ascending racemes -----5. *P. barbinode*.

Nodes glabrous; inflorescence of several short erect racemes.

4. *P. geminatum*.

Plants annual. (FASCICULATA.)

Spikelets glabrous.

Spikelets not over 2 mm. long, not reticulate-veined --6. *P. reptans*.

Spikelets 2 to 3 mm. long, strongly reticulate-veined.

7. *P. fasciculatum*.

Spikelets pubescent.

Plants velvety; rachis pilose -----8. *P. molle*.

Plants glabrous as a whole; rachis scabrous only.

9. *P. adpersum*.

Fruit not transversely rugose (minutely papillose-roughened in *P. milligrana*).

Plants annual.

Spikelets pubescent, 1.2 to 1.3 mm. long, long-pediceled in an open delicate panicle; blades ovate-lanceolate -----41. *P. trichoides*.

Spikelets glabrous, 2 mm. long or more; blades linear or linear-lanceolate.

First glume not over one-fourth the length of the spikelet, truncate or triangular-tipped. (DICHOTOMIFLORA in part.)

Sheaths glabrous -----10. *P. dichotomiflorum*.

Sheaths papillose-hispid -----11. *P. bartowense*.

First glume usually as much as half the length of the spikelet, acute or acuminate. (CAPILLARIA.)

Inflorescence elongate, composed of several approximate implicate panicles -----16. *P. cayennense*.

Inflorescence not composed of approximate nor implicate panicles.

Panicles more than half the length of the entire plant; spikelets 2 to 2.2 mm. long -----14. *P. capillare*.

Panicles not more than one-third the length of the entire plant; spikelets 3 to 3.3 mm. long -----15. *P. hirticaule*.

Plants perennial.

Spikelets short-pediceled along one side of the panicle branches, forming more or less spikelike racemes.

Second glume inflated-gibbous, pubescent -----45. *P. ineptum*.

Second glume not inflated-gibbous.

Blades lanceolate or ovate-lanceolate. (STOLONIFERA.)

- Spikelets hispid and with 2 crateriform glands on the sterile lemma -----39. *P. pulchellum*.
 Spikelets glabrous, glandless; second glume and sterile lemma boat-shaped.
 Blades not over 5 cm., usually 2 or 3 cm., long; second glume rather blunt and shorter than the sterile lemma.
 37. *P. stoloniferum*.
 Blades 5 to 11 cm. long; second glume acute, nearly equaling the sterile lemma-----38. *P. frondescens*.
 Blades linear, often elongate; spikelets glabrous. (LAXA in part.)
 Spikelets not expanded at maturity by an enlarged sterile palea, pointed; nodes densely pubescent.
 30. *P. polygonatum*.
 Spikelets more or less expanded at maturity by the enlarged sterile palea, mostly blunt.
 Blades narrowed toward the base-----34. *P. laxum*.
 Blades cordate or truncate at the base.
 Spikelets 2 mm. long; panicle branches erect or nearly so.
 35. *P. stevensianum*.
 Spikelets not over 1.6 mm. long, usually less; panicle branches spreading or ascending.
 Panicles one-third to half as wide as long; spikelets not conspicuously secund, somewhat irregularly disposed; blades cordate-clasping---33. *P. boliviense*.
 Panicles rarely one-fourth as wide as long; spikelets conspicuously secund and regularly disposed.
 Culms as much as 2 meters long; panicles 25 to 30 cm. long; Trinidad-----31. *P. milleflorum*.
 Culms not over 1 meter long; panicles 5 to 15 cm. long.
 32. *P. pilosum*.
 Spikelets in open or sometimes (AGROSTOIDIA, TENERA) in contracted or congested panicles, but not in 1-sided spikelike racemes.
 Sterile palea enlarged and indurate at maturity, expanding the minute spikelets; spikelets clustered along the ends of the branches-----36. *P. exiguiflorum*.
 Sterile palea if present not enlarged.
 Fruit sparsely silky-pubescent; first glume very small, not over one-fourth the length of the small obovate blunt glabrous spikelets-----40. *P. schiffneri*.
 Fruit glabrous; first glume usually more than one-third the length of the spikelet, if shorter the spikelets not obovate nor blunt.
 First glume short, blunt; spikelets pointed; base of culm usually decumbent, rooting at the nodes. (DICHOTOMIFLORA in part.)
 Fruit not acuminate; panicles rarely over 18 cm. long.
 12. *P. aquaticum*.
 Fruit acuminate; panicles often 40 cm. long; culms succulent; aquatic-----13. *P. elephantipes*.
 First glume usually more than one-third the length of the spikelet.
 Plants forming conspicuous hard creeping scaly rhizomes. (VIRGATA.)

Spikelets not over 2.5 mm. long; first glume less than half the length of the spikelet-----21. *P. repens*.

Spikelets 3 to 7 mm. long (sometimes less than 3 mm. in *P. virgatum cubense*); first glume more than half the length of the spikelet.

Culms decumbent or creeping at base; spikelets 3.2 to 4 mm. long; plants reedlike, as much as 4 meters tall, gregarious; Trinidad and Tobago----23. *P. altum*.

Culms erect; plants less than 2 meters tall, not gregarious.

Spikelets 4.3 to 5.5 mm. long, beaked.

24. *P. amarulum*.

Spikelets not over 3.2 mm. long, not beaked.

22. *P. virgatum cubense*.

Plants not forming creeping scaly rhizomes.

Fruit crested at the apex; spikelets 5.5 to 6 mm. long; plants decumbent at base, forming a tangled mass.

74. *P. zizapioides*.

Fruit not crested.

Panicles narrow and few-flowered; culms erect and wiry; blades drying involute. (TENERA.)

Second glume and sterile lemma exceeding the fruit; spikelets pointed-----25. *P. tenerum*.

Second glume and sterile lemma not exceeding the fruit; spikelets rather blunt.

Pedicels bearing long stiff erect hairs at the summit; Trinidad-----27. *P. caricoides*.

Pedicels not hairy.

Spikelets attenuate at base, about 2 mm. long; leaves more or less pilose; Trinidad.

26. *P. stenodoides*.

Spikelets not attenuate at base, about 1.5 mm. long; leaves glabrous-----28. *P. stenodes*.

Panicles open or contracted, many-flowered.

Panicles 40 to 60 cm. long, the numerous elongate branches in verticils-----49. *P. megiston*.

Panicles mostly much less than 40 cm. long, the branches not verticillate.

Spikelets short-pediceled along the nearly simple panicle branches.

Plants stoloniferous, aquatic or subaquatic; culms decumbent at base; Trinidad--73. *P. grande*.

Plants not stoloniferous; culms erect.

29. *P. condensum*.

Spikelets long-pediceled; panicle open at maturity.

First glume not pointed, two-thirds the length of the spikelet or more; spikelets blunt.

Panicles not over 6 cm. long; plants somewhat glaucous, relatively small. (PARVIFOLIA.)

Culms very slender, decumbent or creeping; blades 1 to 3 cm. long.

43. *P. parvifolium*.

Culms firm, erect or decumbent at base only;
blades 3 to 8 cm. long; Trinidad.

44. *P. cyanescens*.

Panicles 10 to 20 cm. long, very diffuse; plants
tall, not glaucous, decumbent at base.

Spikelets viscid, 3 mm. long.

47. *P. glutinosum*.

Spikelets not viscid, 2 to 2.3 mm. long.

46. *P. millegrana*.

First glume pointed, usually less than two-thirds
as long as the pointed spikelets.

Spikelets not over 1.4 mm. long, pubescent;
panicle large, diffuse; culms straggling.

42. *P. trichanthum*.

Spikelets 2 to 3.5 mm. long.

Spikelets sparsely hispid; culms stout, woody.

48. *P. rudgel*.

Spikelets glabrous. (DIFFUSA.)

Culms as much as 1 cm. thick; blades 2 cm.
or more wide-----19. *P. hirsutum*.

Culms slender; blades not over 1 cm. wide.

Blades 1 to 3 mm. wide; spikelets 2 to 2.5
mm. long; culms glabrous; sheaths
glabrous or nearly so; plants spread-
ing or ascending---17. *P. diffusum*.

Blades mostly about 1 cm. wide; spikelets
3 mm. long; culms and sheaths hir-
sute; plants mostly erect.

18. *P. ghiesbreghtii*.

Subgenus **PAUROCHAETIUM** Hitchc. & Chase.

1. *Panicum distantiflorum* A. Rich. in Sagra, Hist. Cuba 11: 304. 1850.

Limestone hills at low altitudes, Bahamas to Cuba and Haiti, and in Curaçao.
Originally described from Cuba.

2. *Panicum utowanaeum* Scribn. in Millsp. Field Mus. Bot. 2: 25. 1900.

Open rocky soil, mostly near the coast, Cuba, Porto Rico, Guadeloupe, and
Venezuela. Originally described from Porto Rico.

3. *Panicum chapmani* Vasey, Bull. Torrey Club 11: 61. 1884.

Coral sand and shell mounds, southern Florida and the Bahamas. Originally
described from Florida.

TRUE PANICUM.

4. *Panicum geminatum* Forsk. Fl. Aegypt. Arab. 18. 1775.

Moist ground, ditches, and swamps, mostly near the coast, tropical regions of
both hemispheres, in America extending north into southern Florida and
Texas; throughout the West Indies. Originally described from Rosetta, Egypt.

5. *Panicum barbinode* Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 256. 1834.

PARA GRASS.

Cultivated and waste ground, especially in moist places, tropical America,
extending into southern Florida and Texas; introduced in the warmer parts
of the Old World. Originally described from Bahia, Brazil. A valuable forage

grass in the Tropics at low altitudes, used for pasture and for cut green feed. In common with *Eriochloa subglabra* called "malojilla" (see p. 299) in Porto Rico; in Cuba called "hierba del Paral," "hierba bruja," and "paraná;" in the English islands called "Dutch grass" and "Scotch grass."

6. *Panicum reptans* L. Syst. Nat. ed. 10. 2: 870. 1759.

Open ground, at low altitudes, especially near the coast, frequently a weed in waste places and cultivated soil, Gulf Coast of the United States and Atlantic slope of Mexico, throughout the West Indies to northern South America; also introduced in the warm regions of the Eastern Hemisphere. Originally described from Jamaica. In Cuba called "San Juan de Castillo."

7. *Panicum fasciculatum* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Moist open ground, often a weed in fields and waste places, southern Florida and Texas, Mexico, and throughout the West Indies to central South America. Originally described from Jamaica. In Cuba called "súrbana."

8. *Panicum molle* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Open ground, often a weed in fields, Cuba, Jamaica, Mexico, and Central America to Argentina. In Cuba called "súrbana." The type from the West Indies, probably Jamaica. This species was referred by Grisebach¹ to *Panicum carthaginense*.

9. *Panicum adpersum* Trin. Gram. Pan. 146. 1826.

Moist open ground, Florida and throughout the West Indies. Originally described from Santo Domingo.

10. *Panicum dichotomiflorum* Michx. Fl. Bor. Amer. 1: 48. 1803.

Moist ground along streams and a weed in waste places and in cultivated soil, United States, Bermuda, Bahamas, Cuba, and Guadeloupe; also in Panama. Originally described from the United States.

11. *Panicum bartowense* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Circ. 35: 3. 1901.

Low ground, often growing in shallow water, Florida, Bahamas, Cuba, and Jamaica. Originally described from Florida.

12. *Panicum aquaticum* Poir. in Lam. Encycl. Suppl. 4: 281. 1816.

Wet places or in shallow water, margins of streams and ponds, mostly at low altitudes, Cuba, Porto Rico, and Trinidad, and Mexico to Paraguay.

13. *Panicum elephantipes* Nees, Agrost. Bras. 165. 1829.

In ponds and shallow water at low altitudes, Cuba, Jamaica, and Porto Rico, and from Guatemala south to Argentina. Originally described from Brazil.

14. *Panicum capillare* L. Sp. Pl. 58. 1753.

Open ground, common in the eastern United States, introduced in Bermuda. Originally described from Virginia.

PANICUM MILIACEUM L. (HOG MILLET, BROOMCOEN MILLET), introduced from the Old World and escaped from cultivation in the United States, has been found in Porto Rico (*Stevenson* 3052) and St. Croix (*Benzon* in Copenhagen Herb.).

15. *Panicum hirticaule* Presl, Rel. Haenk. 1: 308. 1830.

Rocky or sandy soil, southwestern United States and south to South America; also in Haiti. Originally described from Mexico.

16. *Panicum cayennense* Lam. Tabl. Encycl. 1: 173. 1791.

Open ground and pine woods, Cuba, Jamaica, and Costa Rica to Brazil. Originally described from French Guiana.

¹ Fl. Brit. W. Ind. 546. 1864.

17. *Panicum diffusum* Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Banks, open slopes, and savannas throughout the West Indies. Originally described from Jamaica or Hispaniola.

18. *Panicum ghiesbreghtii* Fourn. Mex. Pl. 2: 29. 1886.

Low moist ground, Mexico to South America and throughout the West Indies, though no specimens are reported from Hispaniola.

19. *Panicum hirsutum* Swartz, Fl. Ind. Occ. 1: 173. 1797.

Open moist ground, Cuba, Jamaica, Guadeloupe, Martinique, and Trinidad, and from central Mexico to South America. Originally described from Jamaica.

20. *Panicum maximum* Jacq. Coll. Bot. 1: 76. 1786. GUINEA GRASS.

Open ground, at low altitudes, escaped from cultivation, southern Florida, through Mexico and the West Indies to South America; a native of Africa and now widespread in the warmer parts of the Old World. An important forage grass throughout the Tropics of the world at low altitudes. Used for pasture, or cut and fed green. In Cuba called "hierba Guinea." Originally described from Guadeloupe.

21. *Panicum repens* L. Sp. Pl. ed. 2. 1: 87. 1762.

Sea beaches, warmer regions of both hemispheres; in America from Alabama to Brazil. In the West Indies known only from Cuba. Originally described from the Old World.

22. *Panicum virgatum cubense* Griseb. Cat. Pl. Cub. 233. 1866.

Pine woods, Atlantic Coastal Plain, Bermuda, and Cuba. Originally described from Cuba.

23. *Panicum altum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 488. f. 57. 1915.

Sandy marshes or flats near the seacoast, British Honduras to Trinidad and Tobago. Originally described from Panama.

24. *Panicum amarulum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 96. f. 87. 1910.

Sandy seashores and coast dunes, southeastern United States, Bahamas, and Cuba. Originally described from Virginia.

25. *Panicum tenerum* Beyr. in Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 341. 1834.

Margins of sandy swamps and ponds and in wet places in sandy woods, southeastern United States, Cuba, and Porto Rico. Originally described from Georgia.

26. *Panicum stenodoides* Hubbard, Proc. Amer. Acad. 49: 497. 1913.

Open grass land and moist savannas, Central America, Trinidad, and northern South America. Originally described from British Honduras.

27. *Panicum caricoides* Nees; Trin. Gram. Pan. 149. 1826.

Wet savannas, Trinidad to Brazil; also the Isle of Pines. Originally described from Brazil.

28. *Panicum stenodes* Griseb. Fl. Brit. W. Ind. 547. 1864.

Borders of ponds and wet savannas, Greater Antilles and Costa Rica to Brazil. Originally described from Jamaica.

29. *Panicum condensum* Nash in Small, Fl. Southeast. U. S. 93. 1903.

Swamps and borders of ponds and streams, southeastern United States, south into Mexico, and in the West Indies in the Bahamas, Cuba, Jamaica, and Porto Rico. Originally described from Florida.

30. *Panicum polygonatum* Schrad. in Schult. Mant. 2: 256. 1824.

Swamps and moist soil, Trinidad and Tobago, and from Mexico to Paraguay. Originally described from Brazil.

31. *Panicum milleflorum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 494. f. 70. 1915.

Swamps, Panama to Trinidad. Originally described from Panama.

32. *Panicum pilosum* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Moist ground, ditches, and swamps, Mexico and throughout the West Indies, except Santo Domingo and Porto Rico, to Paraguay. Originally described from Jamaica.

33. *Panicum boliviense* Hack. Repert. Nov. Sp. Fedde 11: 19. 1912.

Ditches, banks of streams, moist open or wooded ground, southern Mexico and Cuba to Paraguay. Originally described from Bolivia.

34. *Panicum laxum* Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Ditches, banks, moist woods, and wet savannas, Mexico and throughout the West Indies to Paraguay. Originally described from Jamaica.

35. *Panicum stevensianum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 498. f. 76. 1915.

Wet sand along ponds, Cuba and Porto Rico. Originally described from Porto Rico.

36. *Panicum exiguiflorum* Griseb. Cat. Pl. Cub. 234. 1866.

Savannas and moist sandy woods, Bahamas and Cuba. Originally described from Cuba.

37. *Panicum stoloniferum* Poir. in Lam. Encycl. Suppl. 4: 274. 1816.

Moist shady places, Guatemala to Brazil and in Trinidad. Originally described from Cayenne.

38. *Panicum frondescens* Meyer, Prim. Fl. Esseq. 56. 1818.

Moist woods, Mexico to Trinidad and Brazil. Originally described from British Guiana.

39. *Panicum pulchellum* Raddi, Agrost. Bras. 42. 1823.

Moist shady places, southern Mexico and the Windward Islands to Brazil. Originally described from Rio de Janeiro.

40. *Panicum schiffneri* Hack. Ergeb. Bot. Exped. Akad. Wiss. Südbras. 11. 1906.

Wet shady banks and slopes, Porto Rico, Martinique, and St. Vincent, and from southern Mexico to southern Brazil. Originally described from Brazil.

41. *Panicum trichoides* Swartz, Prodr. Veg. Ind. Occ. 24. 1788. ILUSIÓN.

Damp shady places, often a weed in fields and groves, throughout the West Indies and in tropical America generally. Originally described from Jamaica.

42. *Panicum trichanthum* Nees, Agrost. Bras. 210. 1829.

Moist thickets and river banks, Mexico, and Cuba, Jamaica, Porto Rico, and Trinidad, to Paraguay. Originally described from Mexico.

43. *Panicum parvifolium* Lam. Tabl. Encycl. 1: 173. 1791.

Wet savannas and margins of ponds and streams. Cuba, Jamaica, Porto Rico, and Trinidad, and from Costa Rica to Paraguay. Originally described from tropical America.

44. *Panicum cyanescens* Nees, Agrost. Bras. 220. 1829.

Swamps and wet savannas, British Honduras, Isle of Pines (*Britton, Britton & Wilson 14748*), and Trinidad to Brazil. Originally described from Brazil.

45. *Panicum ineptum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 509. f. 98. 1915.

Known only from the type specimen collected in Santo Domingo.

46. *Panicum millegrana* Poir. in Lam. Encycl. Suppl. 4: 278. 1816.

Damp woods and shady banks, Mexico, Cuba, and Trinidad to Paraguay. Originally described from tropical America, probably from Cayenne.

47. *Panicum glutinosum* Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Mountain woods, Mexico, Cuba, Jamaica, Haiti, Santo Domingo, and Porto Rico, to South America. Originally described from Jamaica. Called "bur-grass" and "ginger grass."

48. *Panicum rudgei* Roem. & Schult. Syst. Veg. 2: 444. 1817.

Savannas, Jamaica and British Honduras to Trinidad and Brazil. Originally described from British Guiana.

49. *Panicum megiston* Schult. Mant. 2: 248. 1824.

Swamps, Mexico, Cuba, and Trinidad to Paraguay. Originally described from British Guiana.

Panicum trigonum Retz. of the East Indies has been found in a shaded situation at Port of Spain, Trinidad.

Subgenus *DICHANTHELIUM* Hitchc. & Chase.

50. *Panicum xalapense* H. B. K. Nov. Gen. & Sp. 1: 103. 1816.

Moist banks and rich woods, southeastern United States to Guatemala; also in Santo Domingo. Originally described from Jalapa, Mexico.

51. *Panicum polycaulon* Nash, Bull. Torrey Club 24: 200. 1897.

Open moist woods and savannas, Florida, Cuba, Jamaica, and Porto Rico. Originally described from Florida.

52. *Panicum strigosum* Muhl. in Ell. Bot. S. C. & Ga. 1: 126. 1816.

Sandy woods and open moist ground, southeastern United States to Colombia, and in Cuba, Jamaica, and Santo Domingo. Originally described from South Carolina or Georgia.

53. *Panicum aciculare* Desv.; Poir. in Lam. Encycl. Suppl. 4: 274. 1816.

Grassy slopes and sandy woods, southeastern United States, Cuba, and Porto Rico. The type specimen probably from Porto Rico.

54. *Panicum chrysopsidifolium* Nash in Small, Fl. Southeast. U. S. 100. 1903.

Sandy woods and open moist ground, Florida and Louisiana, and in Cuba, Jamaica, Haiti, Santo Domingo, and Porto Rico. Originally described from Florida.

55. *Panicum fusiforme* Hitchc. Contr. U. S. Nat. Herb. 12: 222. 1909.

Sandy pine woods and open moist ground, Florida, Cuba, Jamaica, and British Honduras. Originally described from Cuba.

56. *Panicum arenicoloides* Ashe, Journ. Elisha Mitchell Soc. 16: 89. 1900.

Sandy pine woods, southeastern United States; also in Guatemala and Cuba (Isle of Pines, Britton & Wilson 14305).

57. *Panicum neuranthum* Griseb. Cat. Pl. Cub. 232. 1866.

Moist savannas, Florida and Cuba. Originally described from Cuba.

58. *Panicum nitidum* Lam. Tabl. Encycl. 1: 172. 1791.

Moist ground and wooded swamps, southeastern United States, Bahamas, and Cuba. Originally described from [South?] Carolina.

59. *Panicum multirameum* Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 2. 1900.

Banks and dry open ground, southern Mexico to Guatemala; also in Jamaica. Originally described from Jalapa, Mexico.

60. *Panicum roanokense* Ashe, Journ. Elisha Mitchell Soc. 15: 44. 1898.

Open swampy woods and wet meadows, Virginia to Texas; also in Jamaica. Originally described from North Carolina.

61. *Panicum caeruleum* Hack.; Hitchc. Contr. U. S. Nat. Herb. 12: 219. 1909.

Marshes and swampy woods, southeastern United States, Bahamas, and Cuba. Originally described from Florida.

62. *Panicum leucothrix* Nash, Bull. Torrey Club 24: 41. 1897.

Pine woods and moist open ground, southeastern United States, Cuba, and Porto Rico. Originally described from Florida.

63. *Panicum wrightianum* Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 44. f. 4. 1898.

Moist sandy soil, coastal plain, Massachusetts to Texas; also in Cuba, whence originally described.

64. *Panicum acuminatum* Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Sandy pine woods, moist banks, and open ground, Cuba and Jamaica; also Colombia. Originally described from Jamaica.

65. *Panicum erectifolium* Nash, Bull. Torrey Club 23: 148. 1896.

Moist pine woods, southeastern United States and Cuba. Originally described from Florida.

66. *Panicum albomarginatum* Nash, Bull. Torrey Club 24: 40. 1897.

Moist sandy woods, southeastern United States, Cuba, and Guatemala. Originally described from Florida. A study of more material may show that *Panicum trifolium* Nash¹ is found in Cuba. The following specimens appear to belong to the latter species; Province of Pinar del Río, *León* 3466; *León & Hioram* 4454. Isle of Pines, *Britton*, *Britton & Wilson* 15383.

67. *Panicum chamaelonche* Trin. Gram. Pan. 242. 1826.

Open sandy soil, southeastern United States and Cuba (Isle of Pines, *Britton*, *Britton & Wilson* 14218, 14221).

68. *Panicum portoricense* Desv.; Hamilt. Prodr. Pl. Ind. Occ. 11. 1825.

Moist sandy woods, southeastern United States, Cuba, and Porto Rico. Originally described from Porto Rico.

69. *Panicum lancearium* Trin. Gram. Pan. 223. 1826.

Sandy pine woods, southeastern United States, British Honduras, Cuba, and Santo Domingo. Originally described from North America, but without definite locality.

70. *Panicum scoparium* Lam. Encycl. 4: 744. 1798.

Wet places, southeastern United States and Cuba. Originally described from South Carolina.

71. *Panicum viscidellum* Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 2. 1900.

Open woods and slopes, Mexico to Colombia; also in Cuba. Originally described from Mexico.

72. *Panicum jooi* Vasey, U. S. Dept. Agr. Div. Bot. Bull. 8: 31. 1889.

Damp woods, southeastern United States, Mexico, and Cuba.

¹ Bull. Torrey Club 26: 580. 1899.

MISCELLANEOUS SPECIES.

73. *Panicum grande* Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 529. *f.* 143. 1915.

Lakes, ponds, and swamps, growing in the water, Panama and Trinidad to Pará. Originally described from Panama.

74. *Panicum zizanioides* H. B. K. Nov. Gen. & Sp. 1: 100. 1816.

Moist, usually shaded places, Mexico and Cuba, Jamaica, and Trinidad to Paraguay. Originally described from Colombia.

75. *Panicum hirtum* Lam. Encycl. 4: 741. 1798.

Damp shady places, Trinidad to Brazil. Originally described from Cayenne.

37. *ICHNANTHUS* Beauv.

Inflorescence and spikelets as in *Panicum*, the first glume often nearly as long as the spikelets, the fruit acute or subacute, the margins of the lemma usually flat, the rachilla produced below the lemma into a minute stipe, this bearing on either side membranaceous appendages adnate to the base of the lemma and free above, the appendages often wanting and indicated by minute excavations only.

Appendages of fertile lemma well-developed wings.

Sheaths densely long-villous.....6. *I. leiocarpus*.

Sheaths glabrate or somewhat pilose.

Blades lanceolate-linear, many times longer than wide; spikelets long-pediceled.....8. *I. ichnodes*.

Blades lanceolate-elliptic, not more than 6 times longer than wide.

7. *I. nemoralis*.

Appendages of fertile lemma reduced to scars.

Blades, or some of them, narrowed into a petiole; plants delicate; blades 3 to 5 mm. wide.....1. *I. mayarensis*.

Blades more or less clasping, often oblique at base, usually over 1 cm. wide.

Glumes with attenuate tips, usually exceeding the sterile lemma and floret; blades thin, more or less pilose.

Spikelets with a few long stiff hairs near the margin toward the summit of both glumes; plants delicate; blades rarely over 4 cm. long and 1 cm. wide.....2. *I. tenuis*.

Spikelets glabrous or scabrous on the midnerves only; blades up to 7 cm. long and 2 cm. wide.....3. *I. nemorosus*.

Glumes acute or acuminate but not attenuate, the first shorter than the spikelet; blades firmer.

Blades oval to ovate-lanceolate, 1.5 to 3.5 cm. wide, often pubescent beneath.....5. *I. axillaris*.

Blades lanceolate, 1 to 2 cm. wide, glabrous.....4. *I. pallens*.

1. *Ichnanthus mayarensis* (Wright) Hitchc. Contr. U. S. Nat. Herb. 12: 228. 1909.

Panicum mayarense Wright, Anal. Acad. Cienc. Habana 8: 206. 1871.

Ichnanthus wrightii Hitchc. Contr. U. S. Nat. Herb. 12: 229. 1909.

A slender, straggling, sparingly branching perennial with delicate but wiry culms, small lanceolate spreading, often petioled blades, and terminal panicles of few to several simple ascending branches with glabrous short-pediceled spikelets.

Dry pine woods and palm barrens, Cuba. Known only from Cuba (Mayarí, Woodfred, Campo Florido, and Arroyo Hondo). The type specimen of *Panicum*

mayarense is from Mayarí; of *Ichnanthus wrightii* from the Río Seco in Arroyo Hondo, Pinar del Río.

2. *Ichnanthus tenuis* (Presl).

Oplismenus tenuis Presl, Rel. Haenk. 1: 319. 1830.

Panicum alsinoides Griseb. Fl. Brit. W. Ind. 550. 1864.

A slender creeping, lightly rooted, freely branching leafy annual, with ascending dorsiventral flowering shoots, pilose sheaths, lanceolate, softly pubescent blades oblique at base, and terminal and axillary panicles with few to several long simple ascending branches, the spikelets with a delicate attenuate tip.

Damp, shady banks, Central America and northern South America, and in Trinidad. Type specimen from Panama. *Panicum alsinoides* was described from Jamaica, St. Kitts, and Trinidad. A specimen in the Gray Herbarium labeled *Panicum alsinoides*, collected in Jamaica by March, is *Oplismenus setarius*. *Ichnanthus tenuis* is not known to us from Jamaica.

3. *Ichnanthus nemorosus* (Swartz) Doell in Mart. Fl. Bras. 2³: 289. 1877.

Panicum nemorosum Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Milium nemorosum Moench, Meth. Suppl. 67. 1802.

A creeping, freely branching perennial with unsymmetrical, narrowly ovate-acuminate spreading, sparsely pilose blades and rather few-flowered short-exserted terminal and axillary panicles.

Shady banks and rich woods, West Indies and Central America. Originally described from Jamaica.

Cuba, Haiti, Santo Domingo, Jamaica, St. Kitts, Martinique, St. Vincent, Grenada, and Trinidad.

4. *Ichnanthus pallens* (Swartz) Munro; Benth. Fl. Hongk. 414. 1861.

Panicum pallens Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Similar to the preceding, stems longer; blades longer, relatively narrower, glabrous (rarely with a few scattered hairs); panicles larger. Rather frequently in this species (and rarely in the others) the spikelets are altered to a series of closely imbricate, sometimes pubescent empty sterile lemmas strikingly different in appearance from the normal spikelets.

Rich woods and shady banks, Tropics of the Western Hemisphere. Originally described from Jamaica. Common on all the islands from Cuba to Trinidad.

5. *Ichnanthus axillaris* (Nees).

Panicum axillare Nees, Agrost. Bras. 141. 1829.

On the average stouter than *I. pallens* but the stems often short; blades broad for their length; panicles larger, more numerous, sometimes produced from all the upper nodes, more densely flowered. Like the preceding, this species is exceedingly variable.

Moist, more or less shaded slopes in the uplands, Santo Domingo, Porto Rico, Trinidad, and Tobago to Ecuador and Brazil. Originally described from Brazil.

6. *Ichnanthus leiocarpus* (Spreng.) Kunth, Rév. Gram. 1: Suppl. X. 1830.

Panicum leiocarpon Spreng. Neu. Entd. 1: 243. 1820.

Navicularia lanata Raddi, Agrost. Bras. 40. 1823.

Culms slender, 1 to 2 meters tall, with villous or lanate sheaths, lanceolate blades, pubescent on both sides, and large open panicles.

Trinidad (*Trin. Bot. Gard. Herb.* 3318) to Brazil. Originally described from Brazil.

7. *Ichnanthus nemoralis* (Schrad.).

Panicum nemorale Schrad.; Schult. Mant. 2: 255. 1824.

Panicum martianum Nees, Agrost. Bras. 138. 1829.

Panicum petiolatum Nees, Agrost. Bras. 140. 1829.

Panicum lagotes Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 326. 1834.

Ichnanthus petiolatus Doell in Mart. Fl. Bras. 2¹: 278. 1877.

A straggling or clambering perennial, a meter or more long, with short-petioled broad blades, puberulent beneath, and long-exserted, rather open panicles, the short-pedicelled spikelets about 5 mm. long.

Among shrubs, Trinidad (*Trin. Bot. Gard. Herb.* 2278) and Tobago (*Broadway* 4472) to Brazil. Originally described from Brazil. The type specimens of all the synonyms mentioned above also come from Brazil.

8. *Ichnanthus ichnodes* (Griseb.).

Panicum ichnodes Griseb. Fl. Brit. W. Ind. 551. 1864.

A robust, sparingly branching perennial about 2 meters tall with pilose or sometimes glabrate sheaths, long flat scabrous blades, as much as 2.5 cm. wide, and large many-flowered panicles with whorled, finally spreading branches and blunt long-pedicelled spikelets, the wings on the fertile lemma well developed, one-fourth the length of the fruit. When immature the panicle branches are erect, giving the panicle a dense club-shaped form very unlike that of the spreading mature panicle.

Wood borders, in partial shade, Trinidad, whence originally described, to Brazil.

38. *LASIACIS* (Griseb.) Hitchc.

Inflorescence of open (rarely compact) panicles terminating the culm and leafy branches; spikelets subglobose, placed obliquely on their pedicels; glumes and sterile lemma broad, papery, shining, glabrous, commonly lanate at the apex; fruit white, bony-indurate, obovoid, both lemma and palea bearing at the apex, in a slight crateriform excavation, a tuft of woolly hairs, the palea concave below, gibbous above, the apex often free at maturity; woody-stemmed clambering (rarely crawling) perennials.

The climbing species are called "tibisí" in Cuba, a name which is also applied to clambering bamboos and to *Olyra latifolia*.

Main stem prostrate.

Blades lanceolate, mostly less than 5 cm. long; flowering branches strongly dorsiventral, mostly prostrate.....1. *L. rugelii*.

Blades linear-lanceolate, about 10 to 12 cm. long; flowering branches ascending, not dorsiventral.....2. *L. grisebachii*.

Main stem clambering (rooting at the lower nodes in no. 3).

Ligule noticeable, brown, about 2 mm. long.

Blades scabrous on both surfaces, otherwise glabrous, elongate, more than 10 times as long as wide.....3. *L. oaxacensis*.

Blades puberulent beneath, glabrous above, less than 10 times as long as wide.....6. *L. ligulata*.

Ligule inconspicuous, hidden by the mouth of the sheath (sometimes as much as 1 mm. long).

Blades glabrous on both surfaces.

Blades narrow, usually 3 to 4 mm., sometimes 5 mm., wide, 8 to 10 cm. long.....4. *L. harrisii*.

Blades more than 5 mm. wide, or if narrower the length only 4 or 5 cm.

Panicles few-flowered, 5 to 10 cm. long; branches strongly zigzag, the branchlets divaricate or reflexed; blades mostly less than 1 cm. wide (sometimes wider on vigorous sterile shoots)5. *L. divaricata*.

Panicles many-flowered, usually 15 to 25 cm. or more long; branches straight or arcuate, not zigzag; blades mostly over 1.5 cm. wide.

Spikelets 4.5 to 5 mm. long, on short stiff appressed pedicels -----7. *L. sloanei*.

Spikelets 3.5 to 4 mm. long, on flexuous pedicels.

8. *L. patentiflora*.

Blades pubescent on one or both surfaces.

Blades narrowly lanceolate, averaging 8 to 10 times as long as wide; panicle large and open-----9. *L. sorghoidea*.

Blades ovate-lanceolate, usually 3 to 5 times as long as wide; panicle usually compact, rather narrow---10. *L. ruscifolia*.

1. *Lasiacis rugelii* (Griseb.) Hitchc. Bot. Gaz. 51: 302. 1911.

Panicum rugelii Griseb. Cat. Pl. Cub. 233. 1866.

Prostrate, the main canes slender; branches commonly fascicled, very leafy, the pubescent sheaths overlapping, the small lanceolate firm puberulent, somewhat cinereous blades oblique at base; panicles short-exserted, few-flowered.

Rich woods, western Cuba, whence originally described, the type specimen being *Rugel* 188 from Matanzas. Richard¹ refers this species to *Panicum ruscifolium* H. B. K.

2. *Lasiacis grisebachii* (Nash) Hitchc. Bot. Gaz. 51: 302. 1911.

Panicum grisebachii Nash, Bull. Torrey Club 35: 301. 1908.

Stems more slender, freely producing rootlets, the long narrow blades not crowded; panicle branches ascending.

Rich woods and shady banks, carpeting the floor of dark thickets, western Cuba, whence originally described, the type specimen being *Britton & Shafer* 758 from Madruga.

3. *Lasiacis oaxacensis* (Steud.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911.

Panicum oaxacense Steud. Syn. Pl. Glum. 1: 73. 1854.

Slender, straggling, decumbent and geniculate at base, with numerous aerial rootlets, the long branches ascending and arcuate, with narrow scabrous blades commonly 20 cm. long, and large open few-flowered panicles, the spikelets borne at the ends of the branchlets.

Edges of woods, western Jamaica, Mexico, and Central America. Originally described from Oaxaca.

4. *Lasiacis harrisii* Nash, Torreya 13: 274. 1913.

Climbing among bushes to a height of 5 meters or more, the main canes slender but strong, the very slender branches pendent, the young twigs commonly rosy purplish; blades linear, thin, and lax; panicles small, numerous, short-exserted, or partly included. This species is more completely glabrous than any other of the genus in the West Indies.

Shaded slopes, mostly at higher altitudes, Jamaica (Blue Mountains), Porto Rico (Quebradillas, Maricao, and Cayey), and St. Jan. Originally described from Jamaica, the type specimen collected at Cinchona by Della Marble (no. 222). In Jamaica the species is found in the Blue Mountains at an altitude of 1,000 to 1,500 meters; in Porto Rico at an altitude of about 800 meters.

5. *Lasiacis divaricata* (L.) Hitchc. Contr. U. S. Nat. Herb. 15: 16. 1910.

Panicum divaricatum L. Syst. Nat. ed. 10. 2: 871. 1759.

Panicum bambusoides Desv.; Hamilt. Prodr. Pl. Ind. Occ. 10. 1825.

¹ In Sagra, Hist. Cuba 11: 307. 1850.

Panicum chauvinii Steud. Syn. Pl. Glum. 1: 68. 1854.

Panicum divaricatum var. *stenostachyum* Griseb. Fl. Brit. W. Ind. 551. 1864.

Shrubby, with strong canes, clambering to a height of 3 or 4 meters, the main branches often fascicled, the vigorous secondary foliage shoots mostly strongly divaricate or zigzag; usually glabrous throughout except on the margin of the sheaths; blades commonly less than 1 cm. wide, only on vigorous shoots as much as 1.5 cm. wide; panicles usually less than 10 cm. long, the branches deflexed at maturity.

Among shrubs at low altitudes, southern Florida to Central and South America, throughout the West Indies. Originally described from Jamaica. The type of *Panicum bambusoides* is from Porto Rico; of *P. chauvinii* from Guadeloupe; of *P. divaricatum* var. *stenostachyum* from Jamaica. This species and *L. sloanei* were included by Richard¹ under the name *Panicum glutinosum*. In Cuba called "pito de bejuco."

The commonest West Indian species of the genus, growing on all the islands, especially near the coast.

6. *Lasiacis ligulata* sp. nov.

Panicum divaricatum var. *puberulum* Griseb. Fl. Brit. W. Ind. 551. 1864.

Clambering to a height of 5 to 10 meters, the robust glabrous central cane as much as 1 cm. in diameter, the wide-spreading main branches and the arcuate secondary ones not in fascicles, not zigzag; sheaths ciliate on the overlapping margin, otherwise glabrous; ligule membranaceous-ciliate, brown, 1 to 2 mm. long; blades flat, firm, 6 to 12 cm. long, 0.8 to 1.5 cm. wide, lanceolate, acuminate, narrowed to the base, glabrous on the upper surface, puberulent beneath, the margins scabrous; panicles ovoid, terminating the numerous branches, exserted or partly included, rather open, 5 to 10 cm. long, usually half to three-fourths as wide, the branches few, spreading, finally reflexed, branching or flowering from near the base, usually bearing 5 to 10 short-pediceled spikelets; spikelets about 4 mm. long, obovoid and purplish black at maturity, the glumes and sterile lemma as well as the fruit with a lanate tuft at the tips.

Type in the U. S. National Herbarium, nos. 865564 and 865565 (both specimens from the same individual), collected among bushes along stream, St. Anns, near Port of Spain, Trinidad, November 28, 1912, by A. S. Hitchcock (no. 10007).

In habit this species resembles *L. divaricata*, from which it differs in the long ligule, the puberulent under surface of the blades, and the arcuate or nearly straight, not zigzag branchlets.

Panicum divaricatum var. *puberulum* was described from Trinidad, the type collected by Crueger. This species was collected at Bahia by Salzmann and distributed as *Panicum fruticosum* Salzm. This name was mentioned by Steudel² as a synonym under *Panicum praegnans*, a different species from Oaxaca, and under *Panicum latifolium* by Doell³ as a synonym.

Clambering over bushes and small trees, Porto Rico to Brazil.

Porto Rico (Arecibo, Chase 6454; Mayaguez, Britton & Marble 678; Maricao, Sintenis 215;⁴ Cayey, Chase 6734, 6747; Sierra de Luquillo, Sintenis 1557; Lares, Sintenis 5918), Tortola (Shafer 1147), St. Thomas (Britton & Marble 1230), Trinidad (Tabaquite, Hitchcock 10120; Port of Spain, Hitchcock 9962, 10007; Cedros, Hitchcock 10151; St. Joseph, Hitchcock 10020; Tamana, Broad-

¹ In Sagra, Hist. Cuba 11: 307. 1850.

² Syn. Pl. Glum. 1: 74. 1854.

³ In Mart. Fl. Bras. 2^a: 207. 1877.

⁴ This number in the Krug & Urban Herbarium is *Lasiacis sorghoidea*.

way 4952, 4959; Caparo woods, *Broadway* 4923), and Tobago (center of island, *Hitchcock* 10261, 10262, 10269, 10275; Greenhill, *Broadway* 4038; Belmont woods, *Broadway* 3551).

7. *Lasiacis sloanei* (Griseb.) Hitchc. Bot. Gaz. 51: 302. 1911.

Panicum latifolium Hamilt. Prodr. Pl. Ind. Occ. 10. 1825, not L. 1753.

Panicum sloanei Griseb. Fl. Brit. W. Ind. 551. 1864.

Climbing to a height of 3 or 4 meters, forming a strong central cane; branches solitary or 2 or 3 together, elongate; blades parchment-like in texture at maturity, commonly 12 to 15 cm. long and 2 to 3 cm. wide, narrowed into a very short pubescent petiole; panicles commonly as much as 20 cm. long, nearly as wide, the branches rather rigid. The spikelets are larger in this species than in any other of the genus in the region.

Climbing among bushes and small trees, West Indies to South America. Originally described from Jamaica; *P. latifolium* described from the Antilles.

Cuba, Jamaica, Santo Domingo, Porto Rico, Dominica, St. Vincent, Grenada, and Trinidad.

8. *Lasiacis patentiflora* sp. nov.

High-climbing with a strong central cane as much as 8 mm. thick, the plant glabrous throughout except at the summit of the sheaths; branches numerous, solitary, widely spreading and finally repeatedly branching, the branches and branchlets straight or arcuate, divergent at a rather narrow angle; sheaths with a ring of hairs at the summit or at least a tuft of hairs on either side, sometimes pubescent on the margins toward the summit; ligule about 0.5 mm. long, thin-membranaceous; blades on vigorous shoots as much as 14 cm. long and 2.5 mm. wide, but mostly about 8 to 12 cm. long and 1.5 to 2 cm. wide, acuminate, rounded-tapering to the base, usually somewhat unsymmetrical, glabrous, scabrous on the margin and somewhat so on both surfaces; panicles numerous, short-exserted, mostly 12 to 20 cm. long, nearly as wide, the slender axis and distant spreading flexuous branchlets angled, scabrous, the pedicels flexuous, spreading; spikelets pale, blotched with dark blue or purple at maturity, 3.4 to 3.8 mm. long, globose-obovoid, the glumes and sterile lemma lanate-ciliate on the margin toward the apex; fruit 3 mm. long, 2 mm. wide.

Type in the U. S. National Herbarium, no. 865566, collected in the edge of woods on a mountain side, center of the island of Tobago, December 20, 1912, by A. S. Hitchcock (no. 10268).

In habit and general appearance *L. patentiflora* resembles *P. sloanei*, from which it differs in the narrower average width of the blades and the more loosely flowered, rather large panicles with smaller spikelets on flexuous spreading pedicels.

Borders of woods and jungles, Dominica, Trinidad (Port of Spain, *Hitchcock* 9990, 10323, 10324; Heights of St. Ann, *Hitchcock* 10034; River Estate, *Hitchcock* 10037), and Tobago (Spey Side, *Hitchcock* 10255, 10257; center of island, *Hitchcock* 10268, 10270; The Whim, *Broadway* 4841); also in Venezuela.

9. *Lasiacis sorghoidea* (Desv.).

Panicum lanatum Swartz, Prodr. Veg. Ind. Occ. 24. 1788, not Rottb. 1776.

Panicum sorghoideum Desv.; Hamilt. Prodr. Pl. Ind. Occ. 10. 1825.

Panicum lanatum var. *sorghoideum* Griseb. Fl. Brit. W. Ind. 551. 1864.

Panicum martinicense Griseb. Fl. Brit. W. Ind. 552. 1864.

Panicum swartzianum Hitchc. Contr. U. S. Nat. Herb. 12: 140. 1908.

Lasiacis swartziana Hitchc. Bot. Gaz. 51: 302. 1911.

Erect or clambering to a height of 5 to 7 meters, with a strong central cane as much as 1 cm. thick, the main branches 1 meter or more long, arcuate, bearing slender branchlets toward the pendent ends; sheaths and both surfaces of

the blades velvety, or the sheaths glabrescent, the blades of the main branches commonly 20 cm. long and 2.5 cm. wide, those of the branchlets much smaller, often less velvety; panicles usually about 10 to 20 cm. long, at maturity as wide or wider, the spikelets more or less clustered on the long distant branches.

Ravines, wood borders, and hedges, Mexico and the West Indies to South America. *Panicum sorghoideum* was described from Porto Rico; *Panicum lanatum* (upon which *Panicum swartzianum* was based) from Jamaica, and *P. martinicense* from Martinique.

Cuba (Province of Santa Clara), Jamaica, Porto Rico, St. Thomas, St. Croix, Antigua, Montserrat, Guadeloupe, Dominica, Martinique, St. Vincent, Grenada, Trinidad, and Tobago.

10. *Lasiacis ruscifolia* (H. B. K.).

Panicum ruscifolium H. B. K. Nov. Gen. & Sp. 1: 101. 1816.

Panicum compactum Swartz, Adnot. Bot. 14. 1829, not Kit.; Schult. Oesterr.

Fl. ed. 2, 1: 212. 1814, as synonym.

Lasiacis compacta Hitchc. Bot. Gaz. 51: 302. 1911.

More robust than any other species, freely branching, with numerous leafy dorsiventral shoots with broad blades, velvety or glabrous beneath, glabrous or scabrous above, the sheaths glabrous or nearly so, the scarcely exserted, oblong or club-shaped panicles usually compactly flowered.

In all the Trinidad specimens the spikelets contain a second sterile lemma, a character not found in any other species known to us. This second sterile lemma equals the first, contains a hyaline palea, and infolds the fruit rather more closely than the sterile lemma commonly does in other species. The fruit borne one joint higher on the rachilla consequently faces in the direction opposite to the one usual in Paniceae; that is, the palea side of the fruit faces the second instead of the first glume.

Climbing over bushes, Cuba, Jamaica (Bluefields), Trinidad, and Mexico (whence originally described) to northern South America. No locality is mentioned in the original description of *P. compactum*, but the specimen in the Swartz Herbarium is labeled Jamaica.

39. *SACCIOLEPIS* Nash.

Inflorescence a narrow spikelike panicle; spikelets pointed, the second glume and sterile lemma inflated (the glume more or less saccate), much larger than the minutely stipitate fruit.

Spikelets 4 mm. long on slender pedicels-----1. *S. striata*.

Spikelets 2 to 3 mm. long, subsessile.

Spikelets 3 mm. long; panicle often interrupted-----2. *S. vilvoides*.

Spikelets 2 mm. long; panicle dense-----3. *S. myuros*.

1. *Sacciolepis striata* (L.) Nash, Bull. Torrey Club 30: 383. 1903.

Holcus striatus L. Sp. Pl. 1048. 1753.

Panicum striatum Lam. Tabl. Encycl. 1: 172. 1791.

Panicum gibbum Ell. Bot. S. C. & Ga. 1: 116. 1816.

Panicum elliottianum Schult. Mant. 2: 256. 1824.

Panicum aquaticum Bosc; Spreng. Syst. Veg. 1: 319. 1825.

Hymenachne striata Griseb. Fl. Brit. W. Ind. 554. 1864.

Sacciolepis gibba Nash in Britton, Man. 89. 1901.

An aquatic or semiaquatic glabrous perennial, the culm 1 to 2 meters tall, rooting at the geniculate lower nodes, bearing a few erect branches, with long, flat blades and narrow panicles 10 to 20 cm. long.

Swamps and ditches, southeastern United States to Cuba (Hanábana, Lake Ariguanabo), Porto Rico (Humacao, Santurce, Campo Alegre), and Jamaica

(Montagne, Grosmond). Originally described from Virginia. The type of *Panicum gibbum* is from South Carolina, that of *Panicum aquaticum* from Bermuda.

2. *Sacciolepis vilvoides* (Trin.) Chase, Proc. Biol. Soc. Washington 21: 7. 1908.
Panicum vilvoides Trin. Gram. Pan. 171. 1826.

Hymenachne fluviatilis Nees, Agrost. Bras. 273. 1829.

A tall aquatic glabrous perennial with succulent unbranched culms and elongate linear blades; panicles about 8 mm. wide and 15 to 50 cm. long.

Swamps, Cuba (Pinar del Río, Isle of Pines) and northern South America. Originally described from Brazil, the type of *Hymenachne fluviatilis* also from Brazil.

3. *Sacciolepis myuros* (Lam.) Chase, Proc. Biol. Soc. Washington 21: 7. 1908.
Panicum myuros Lam. Tabl. Encycl. 1: 172. 1791.

Panicum myosurus Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792.

Hymenachne myurus Beauv. Ess. Agrost. 49, 165. 1812.

Panicum phleiforme Presl, Rel. Haenk. 1: 302. 1830.

Similar to *S. vilvoides* in habit but annual, the blades mostly narrower, the panicles compact, spikelike, about 5 mm. thick.

Swamps and wet places, Mexico, Cuba (Isle of Pines), and Trinidad (Piarco Savanna, Pitch Lake) to South America. Originally described from tropical America, the type being from Cayenne. *Panicum myosurus* was also described from Cayenne; *Panicum phleiforme* from Mexico and Luzon. Grisebach¹ misapplies the name *Hymenachne fluviatilis* to this species.

40. HYMENACHNE Beauv.

Spikelets short-pedicellate in long dense spikelike or interrupted panicles; spikelets acuminate; lemma and palea scarcely indurate, the margins of the lemma flat, the palea not inclosed above.

Inflorescence dense, spikelike-----1. *H. amplexicaulis*.
 Inflorescence long and narrow with ascending branches, not spikelike.

2. *H. auriculata*.

1. *Hymenachne amplexicaulis* (Rudge) Nees, Agrost. Bras. 276. 1829.

Panicum amplexicaule Rudge, Pl. Guian. 1: 21. pl. 27. 1805.

Agrostis monostachya Poir. in Lam. Encycl. Suppl. 1: 256. 1810.

Panicum hymenachne Desv. Opusc. 82. 1831.

A glabrous aquatic perennial with succulent sparingly branching culms, broad linear cordate-clasping blades, the panicles about 8 mm. thick and 20 to 50 cm. long.

Swamps and shallow water, often forming pure colonies, Tropics and Subtropics of both hemispheres. Originally described from British Guiana. The type of *Agrostis monostachya* and *Panicum hymenachne* is from Porto Rico. Grisebach¹ misapplies the name *Hymenachne myurus* to this species.

Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, Guadeloupe, Dominica, Martinique, and Trinidad.

2. *Hymenachne auriculata* (Willd.) Chase, Proc. Biol. Soc. Washington 21: 5. 1908.

Panicum auriculatum Willd. in Spreng. Syst. Veg. 1: 322. 1825.

Panicum polystachyum Presl, Rel. Haenk. 1: 312. 1830.

Hymenachne patula Fourn. Mex. Pl. 2: 37. 1886.

¹ Fl. Brit. W. Ind. 553. 1864.

Similar to *H. amplexicaulis*, olivaceous throughout (at least when dry), the panicles of numerous ascending, densely flowered branches, the lower distant.

River banks and shallow water, Cuba (Almendares River) and Trinidad (Oropuche) to South America. Originally described from tropical America, no definite locality given. The type of *Hymenachne patula* is Liebmann 402 from Bejucal, Cuba.

41. SCUTACHNE Hitchc. & Chase.

Inflorescence paniculate; spikelets acuminate, attenuate at base; first glume membranaceous; second glume and sterile lemma leathery-indurate, the lemma inclosing a palea of like texture; fruit but slightly more indurate than the sterile lemma, mucronate, the summit of the palea not inclosed, densely pubescent on the margin.

Culms leafy, the blades elongate; panicles terminal only, of several branches.

1. *S. dura*.

Culms nearly naked, the leaves reduced to the sheaths or nearly so, the basal leaves with blades; panicles terminal and axillary, simple.

2. *S. amphistemon*.

1. *Scutachne dura* (Griseb.) Hitchc. & Chase, Proc. Biol. Soc. Washington 24: 149. 1911.

Panicum durum Griseb. Mem. Amer. Acad. n. ser. 8: 533. 1862.

Alloteropsis dura Hitchc. Contr. U. S. Nat. Herb. 12: 211. 1909.

A glabrous ascending perennial, 4 to 7 cm. tall, with wiry simple culms, thick harsh blades, and panicles 6 to 10 cm. long, the long branches narrowly ascending, the hairy brown spikelets about 5 mm. long.

Rocky hills, Cuba (Farallones, Valestina), Jamaica (Albion Mountain), and Santo Domingo (Salinas). Originally described from eastern Cuba, the type being Wright 1539.

2. *Scutachne amphistemon* (Wright) Hitchc. & Chase, Proc. Biol. Soc. Washington 24: 149. 1911.

Panicum amphistemon Wright, Anal. Acad. Cienc. Habana 8: 207. 1871.

Alloteropsis amphistemon Hitchc. Contr. U. S. Nat. Herb. 12: 211. 1909.

Culms tufted, slender, wiry, 25 to 40 cm. tall, the leaves clustered at the base, the flat blunt or rather abruptly pointed blades 10 to 15 cm. long, the panicles few-flowered.

Rocky slopes, Province of Oriente, Cuba, whence originally described, the type being Wright 3484, from Mayarí Abajo; found also in Loma Mensura (Shafer 3807).

42. ISACHNE R. Br.

Inflorescence paniculate; spikelets small, subglobose; glumes subequal; lower floret perfect or staminate, its lemma and palea indurate and similar in form and texture to those of the upper floret; both fruits, plano-convex, nearly equal in size, usually remaining attached by the minute rachilla joint between them.

Fertile floret appressed-pubescent.

Blades linear.....1. *I. leersioides*.

Blades ovate-clasping.....8. *I. polygonoides*.

Fertile floret glabrous.

Panicle contracted, spikelike, not over 3 cm. long, the branches appressed or the lower sometimes ascending; plants low and spreading.

2. *I. pygmaea*.

Panicle open, the branches spreading or ascending.

Blades about 3 mm. wide, thick, rigid, pungent, with conspicuously thickened midrib-----4. *I. rigidifolia*.

Blades mostly 0.5 to 2 cm. wide, firm but not pungent nor with thickened midrib.

Stems trailing; blades rarely over 5 cm. long-----3. *I. rigens*.

Stems clambering; blades mostly more than 8 cm. long.

Glumes pubescent; blades firm, not over 12 cm. long and 1 cm. wide -----5. *I. angustifolia*.

Glumes glabrous (rarely obscurely pubescent at tips); blades mostly over 15 cm. long and 1.5 cm. wide.

Spikelets aggregated toward the ends of the branches and branchlets-----6. *I. arundinacea*.

Spikelets not aggregated; panicle loosely flowered.

7. *I. disperma*.

1. *Isachne leersioides* Griseb. Mem. Amer. Acad. n. ser. 8: 533. 1862.

Tufted, straggling; culms elongate, wiry, branching; blades 7 to 12 cm. long, 2 to 4 mm. wide; panicles open, loosely flowered, the minute hairy spikelets on flexuous but stiff gland-bearing pedicels.

Dry cliffs and pine barrens, Cuba (Woodford, La Perla, Sierra de las Yeguas, south foot of Cajalbana). The type specimen is *Wright* 755, from eastern Cuba.

2. *Isachne pygmaea* Griseb. Fl. Brit. W. Ind. 553. 1864.

Slender, trailing, with ascending flowering branches 12 to 15 cm. long, the lower leaves bladeless, the upper with overlapping sheaths and divergent white-margined blades 1 to 3 cm. long, the narrow compact panicles 1 to 3 cm. long, the spikelets globose.

Grassy banks in the Blue Mountains of Jamaica at about 1,500 meters altitude (Cold Spring Gap, Moodys Gap). Originally described from a specimen collected by Macfadyen, no locality given.

3. *Isachne rigens* (Swartz) Trin. Gram. Pan. 252. 1826.¹

Panicum rigens Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Tufted; culms long, slender, wiry, trailing, the numerous flowering shoots curving upward, the firm divergent scabrous white-margined blades 3 to 5 cm. long, 3 to 7 mm. wide, the pyramidal panicles 3 to 5 cm. long, about three-fourths as wide.

Damp shady banks, Blue Mountains, Jamaica, at 1,000 to 2,000 meters altitude. Originally described from Jamaica.

4. *Isachne rigidifolia* (Poir.) Urban, Symb. Antill. 4: 85. 1903.²

Agrostis rigidifolia Poir. in Lam. Encycl. Suppl. 1: 257. 1810.

Milium rigidum Poir. in Lam. Encycl. Suppl. 1: 257. 1810, as synonym of *Agrostis rigidifolia*.

Milium rigidifolium Roem. & Schult. Syst. Veg. 2: 319. 1817.

Panicum rigidifolium Kunth, Rév. Gram. 1: 37. 1829.

Culms trailing, compressed, with short internodes throughout, branching toward the end, the base simple and naked, the branches with overlapping sheaths, the smooth rigid spreading pointed blades 3 to 5 cm. long, about 3 mm. wide, with a prominent midnerve; panicles long-exserted, about 5 cm. long, 2 to 3 cm. wide.

¹ For discussion of the species confused with this by Trinius and others see Hitchcock, Contr. U. S. Nat. Herb. 12: 138. 1908.

² For discussion of species referred to this name by Urban see Hitchcock, Contr. U. S. Nat. Herb. 12: 138. 1908.

Mountain meadows, Haiti, Santo Domingo (Río Yaque), Saba, Guadeloupe, and Martinique. Originally described from Santo Domingo.

5. *Isachne angustifolia* Nash, Bull. Torrey Club 30: 377. 1903.

Culms often 2 meters long, hard and wiry with a long naked base, branching from the upper nodes, the branches long, leafy, nearly parallel, bearing secondary branches toward the ends, the whole forming a wide flabellate or loosely corymbose mass, in its most characteristic development pushing through the jungle of stream bank or trail side and hanging over the bushes; blades firm, divergent, 5 to 12 cm. long, 5 to 10 mm. wide, paler beneath; panicles commonly 10 to 12 cm. long, about half as wide.

Rocky slopes among brush, Porto Rico (at higher altitudes) and Guadeloupe. Type specimen *Wilson* 160, collected on the summit of El Yunque, Luquillo Mountains, Porto Rico.

6. *Isachne arundinacea* (Swartz) Griseb. Fl. Brit. W. Ind. 553. 1864.

Panicum arundinaceum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Isachne panicea Trin. Gram. Pan. 253. 1826.

Climbing among shrubs or small trees to a height of as much as 6 meters, with strong canes and elongate branches; blades commonly 20 cm. long and 1.5 to 2 cm. wide, scabrous; panicles about 12 cm. long, the long lower branches at first ascending, finally wide-spreading; spikelets crowded toward the ends of the branches.

Wooded hillsides, Jamaica at an altitude of 1,000 to 2,000 meters; also Mexico to northern South America. Originally described from Jamaica.

7. *Isachne disperma* (Lam.) Doell in Mart. Fl. Bras. 2³: 274. 1877.

Panicum dispernum Lam. Tabl. Encycl. 1: 173. 1791.

Panicum multinerve Desv.; Poir. in Lam. Encycl. Suppl. 4: 279. 1816.

Isachne dubia Kunth, Rév. Gram. 1: 42. 1829.

Similar to the preceding, the blades larger, smooth, the panicles larger, the spikelets scattered.

Mountain woods, Lesser Antilles. Originally described from tropical America. There is nothing on the label of the type specimen to indicate its origin. *Panicum multinerve* is described from the Antilles. The label of the type specimen indicates that the plant came from Porto Rico. As the species has not since been collected upon that island, the locality may be doubted.

St. Kitts, Guadeloupe, Dominica, Martinique, St. Vincent, Grenada, and Tobago.

8. *Isachne polygonoides* (Lam.) Doell in Mart. Fl. Bras. 2³: 273. 1877.

Panicum polygonoides Lam. Encycl. 4: 742. 1798.

Panicum trachyspermum Nees, Agrost. Bras. 212. 1829.

Isachne trachysperma Nees in Seem. Bot. Voy. Herald 224. 1857.

Flowering shoots 20 to 30 cm. tall, erect from a long creeping, freely branching culm, rooting at the nodes, the whole plant often a meter in length, the erect shoots finally bearing fascicled branchlets, the sheaths hispid, the spreading lanceolate-ovate blades very scabrous; panicles included at base, about 5 cm. long and as broad, loosely many-flowered.

Moist ground, Central America and Trinidad (Piarco Savanna) to Brazil. Originally described from Cayenne. *Panicum trachyspermum* was described from Brazil.

43. OPLISMENUS Beauv.

Inflorescence of several thick racemes along a common axis; spikelets sessile; glumes and sterile lemma awned or mucronate; fruit as in *Panicum*, acute.

Racemes villous with long hairs; first glume awned from between 2 lobes.

1. *O. burmanni*.

Racemes not villous or with a few long hairs only; first glume tapering into the awn.

Blades of flowering stems mostly 2 to 4 cm. long, 5 to 10 mm. wide; racemes short, usually 3 to 5 mm. long, containing 3 to 5 spikelets.

2. *O. setarius*.

Blades of flowering stems mostly more than 4 cm. long; racemes 1 to 3 cm. long-----3. *O. hirtellus*.

1. *Oplismenus burmanni* (Retz.) Beauv. Ess. Agrost. 54. 1812.

Panicum burmanni Retz. Obs. Bot. 3: 10. 1783.

Oplismenus cristatus Presl, Rel. Haenk. 1: 323. 1830.

A low, creeping, freely branching annual with pilose sheaths, broadly lanceolate-elliptic blades, and 3 to 5 pale villous ascending racemes approximate along a flexuous axis; awns slender, about 1 cm. long.

Open or somewhat shaded ground and waste places, Mexico to South America; also in Santo Domingo (Maniel de Ocoa, Constanza). Common in the Tropics of the Old World, whence probably introduced into America. Originally described from India. *Oplismenus cristatus* was described from Mexico.

2. *Oplismenus setarius* (Lam.) Roem. & Schult. Syst. Veg. 2: 481. 1817.

Panicum setarium Lam. Tabl. Encycl. 1: 170. 1791.

Orthopogon setarius Spreng. Syst. Veg. 1: 306. 1825.

A slender creeping branching perennial, the ascending flowering stems 20 to 30 cm. high, the small lanceolate blades conspicuously undulate-margined, the rachis of the distant racemes very short, the spikelets appearing to be in clusters on the rather strict axis.

Moist woods and shady banks, Georgia to Texas and in the West Indies, here common in the coffee groves. Originally described from tropical America, the particular locality not given.

Bermuda, Bahamas, Cuba, Jamaica, Santo Domingo, Porto Rico, St. Thomas, St. Croix, St. Kitts, Antigua, Dominica, Martinique, and Trinidad.

3. *Oplismenus hirtellus* (L.) Beauv. Ess. Agrost. 54, 168. 1812.

Panicum hirtellum L. Syst. Nat. ed. 10. 2: 870. 1759.

Orthopogon hirtellus Nutt. Gen. Pl. 55. 1817.

Orthopogon loliaceus Spreng. Syst. Veg. 1: 306. 1825.

Orthopogon cubensis Spreng. Syst. Veg. 1: 307. 1825.

Oplismenus cubensis Kunth, Rév. Gram. 1: 45. 1829.

Panicum cubense Steud. Nom. Bot. ed. 2. 2: 255. 1841.

Mostly less slender than the preceding, taller, the blades longer, the ascending or spreading racemes sometimes 3 cm. long. This species is exceedingly variable in size, pubescence, length of racemes, and length of awns, and apparently intergrades with *O. setarius*. The sheaths vary from glabrous to conspicuously hirsute. Grisebach¹ refers the form with glabrous sheaths to *Orthopogon loliaceus* Spreng. (*Oplismenus loliaceus* (Lam.) Beauv.), an Asiatic species. A variegated form has sometimes escaped from cultivation (Guadeloupe, *Duss* 3155. Martinique, *Duss* 1325. Dominica, *Jones* 37).

Moist woods and shady banks, Mexico and throughout the West Indies to South America. The type specimen was from Jamaica. *Orthopogon cubensis* was described from Cuba. Richard² refers the pubescent form to *O. undulatifolius* Roem. & Schult. In Cuba called "pitillo."

¹ Fl. Brit. W. Ind. 545. 1864.

² In Sagra, Hist. Cuba 11: 308. 1850.

44. ECHINOCHLOA Beauv.

Inflorescence paniculate, the usually compact, densely flowered panicle composed of 1-sided racemes or of subsimple branches; spikelets hispid or spiny; glumes usually mucronate; sterile lemma usually awned; fruit subindurate, acuminate-pointed, the summit of the palea not inclosed.

Spikelets awnless or mucronate only; racemes simple, rather remote.

1. *E. colonum*.

Spikelets more or less awned; racemes subcompound, approximate.

Awn not longer than the body of the spikelet; racemes slender, the lower as much as 7 cm. long; plants robust, as much as 2 meters tall.

2. *E. pyramidalis*.

Awn conspicuous.

Ligule obsolete; spikelets, excluding the awns, 3 to 4.5 mm. long.

3. *E. sabulicola*.

Ligule of stiff yellow hairs; spikelets, excluding the awns, 5 to 6 mm. long-----

4. *E. spectabilis*.1. *Echinochloa colonum* (L.) Link, Hort. Berol. 2: 209. 1833.

Panicum colonum L. Syst. Nat. ed. 10. 2: 870. 1759.

A glabrous tufted annual, the culms compressed, branching at the more or less decumbent base; blades flat, linear, about 5 mm. wide, sometimes barred with purplish brown; racemes usually 5 to 10, ascending, distant nearly their own length on the strict axis.

Ditches and moist places in the warmer parts of both hemispheres. Introduced into America. Originally described from Jamaica. A common weed to be found on probably all of the islands of the West Indies. In Cuba the zonate form is called "grama pintada."

2. *Echinochloa pyramidalis* (Lam.).

Panicum pyramidale Lam. Tabl. Encycl. 1: 171. 1791.

Panicum spectabile var. *guadeloupense* Hack. Notizbl. Bot. Gart. Berlin 1: 328. 1897.

A glabrous, sparingly branching, somewhat fleshy annual 2 meters or more tall, with elongate blades 1 to 1.5 cm. wide and a long tapering panicle, the relatively slender branches ascending or slightly drooping.

In ditches, Guadeloupe, introduced from Africa. Originally described from Senegal. *Panicum spectabile* var. *guadeloupense* was described from Guadeloupe.

3. *Echinochloa sabulicola* (Nees) Hitchc. Contr. U. S. Nat. Herb. 17: 257. 1913.

Panicum sabulicola Nees, Agrost. Bras. 258. 1829.

Panicum aristatum Macfad. Bot. Misc. Hook. 2: 115. 1831.

Oplismenus jamaicensis Kunth, Enum. Pl. 1: 147. 1833.

Panicum jamaicense Steud. Nom. Bot. ed. 2. 2: 257. 1841.

An erect, often robust, usually fleshy annual, with nearly simple culms often decumbent and rooting at base, and long narrow nodding panicles of usually long-awned spikelets; sheaths sometimes hirsute or papillose.

Swamps and ditches, Mexico and the West Indies to South America. Originally described from Brazil. *Panicum aristatum*, upon which are based *Oplismenus jamaicensis* and *Panicum jamaicense*, was described from Jamaica. A part of Wright 3879 has hirsute sheaths and was referred to *Echinochloa walteri*.¹ Some of the specimens referred to this species may belong to *E. crus-*

¹ Hitchc. Contr. U. S. Nat. Herb. 12: 213. 1909.

galli L. (to which, under *Panicum*, it is referred by Grisebach¹), common in the United States. The latter differs in the erect rather than nodding panicles, with spreading rather than appressed branches, and in the culms erect or spreading at base rather than decumbent and rooting. Certain specimens from Bermuda (*Collins* 343, *Brown & Britton* 333, *Brown, Britton & Bissett* 1961, all in the herbarium of the New York Botanical Garden) appear to be *E. crusgalli*.

Cuba, Jamaica, Porto Rico, Guadeloupe, Martinique, and Trinidad.

4. *Echinochloa spectabilis* (Nees) Link, Hort. Berol. 2: 209. 1883.

Panicum spectabile Nees, Agrost. Bras. 262. 1829.

A robust fleshy perennial, the tall culms erect from a creeping base, the nodes usually villous, the blades as much as 3 cm. wide, the narrow, densely flowered panicle erect or nearly so.

Swamps and ditches near the coast, southern Mexico and the West Indies to Paraguay. Originally described from Brazil.

Cuba (Almendares River), Jamaica (Savanna-la-Mar), Haiti, Santo Domingo (Rincon), Porto Rico (Mayaguez), Antigua, Martinique, and Tobago.

45. CHAETIUM Nees.

Inflorescence a dense narrow panicle; spikelets lanceolate, the rachilla joint between the glumes elongate, forming, with the bearded adnate base of the first glume, a sharp-pointed callus; glumes and sterile lemma awned; fruit subindurate, awn-tipped, the summit of the palea not inclosed.

1. *Chaetium cubanum* (Wright) Hitchc. Contr. U. S. Nat. Herb. 12: 232. 1909.

Perotis? cubana Wright, Anal. Acad. Cienc. Habana 8: 288. 1871.

A slender erect tufted perennial about 40 cm. tall with narrow blades and delicate few-flowered panicles of small long-awned spikelets.

Only known from the type collection, *Wright* 735, from eastern Cuba.

46. TRICHOLAENA Schrad.

Inflorescence paniculate; spikelets short-pedicellate, the first glume minute, the rachilla joint between the glumes elongate; second glume and sterile lemma copiously clothed with long, silky hairs, 2-lobed, with a delicate awn between the lobes; fruit subindurate.

1. *Tricholaena rosea* Nees, "Cat. Sem. Hort. Vratisl. a. 1836;" Fl. Afr. Austr. 17. 1841.

NATAL GRASS.

A tufted short-lived slender perennial, about 1 meter tall, more or less decumbent at base, with sparsely papillose-hirsute sheaths, narrow flat blades, and beautiful silky rosy purple panicles (in herbarium specimens sometimes faded to pinkish gray).

Occasional in waste ground, sparingly introduced in the warmer regions of the Western Hemisphere. Originally described from South Africa.

Cuba (Habana, Campo Florido, Matanzas).

47. CHAETOCHLOA Scribn.

Inflorescence a dense spikelike (rarely loose) panicle, the spikelets solitary or in small clusters subtended by 1 to several slender scabrous bristles (sterile branchlets), these persistent after the fall of the spikelets; spikelets as in *Panicum*, turgid, the fruit usually transversely rugose.

¹Fl. Brit. W. Ind. 546. 1864.

Bristles solitary, below only part of the spikelets; branches of the panicle elongate; blades broad, usually more than 1 cm. wide, plaited, tapering at each end. (Section PTYCHOPHYLLUM.)

Plants annual; blades 1 to 3 cm. wide; main panicle branches rather distant, 1 to 3 cm. long-----1. *C. barbata*.

Plants perennial; blades 3 to 8 cm. wide; main panicle branches approximate, mostly over 3 cm. long.

Panicle dense, long and narrow, the branches ascending; sheaths glabrous or mostly so -----2. *C. sulcata*.

Panicle loose, the branches spreading or drooping, the lower 10 to 15 cm. long; sheaths hirsute-----3. *C. palmifolia*.

Bristles 1 or more below each spikelet (or below only a part of the spikelets in *C. setosa*).

Plants annual.

Bristles antrorsely scabrous.

Bristles 5 to 12 at the base of each spikelet; second glume half as long as the rugose fruit-----11. *C. lutescens*.

Bristles 1 to 3 at the base of each spikelet; second glume about as long as the spikelet.

Plants robust; spike 15 to 30 mm. thick; fruit smooth.

12. *C. magna*.

Plants slender, rarely 1 meter tall; spike scarcely 1 cm. thick; fruit slightly roughened-----13. *C. viridis*.

Bristles, or some of them, retrorsely scabrous.

Plants 1 meter or more tall; bristles mostly more than 1 cm. long, divaricate and implicate-----15. *C. tenacissima*.

Plants low (rarely 70 cm. high), often spreading; bristles usually not over 5 mm. long, straight or nearly so.

Rachis villous; bristles several below each spikelet.

16. *C. scandens*.

Rachis not villous; bristles 1 or 2 below each spikelet.

14. *C. verticillata*.

Plants perennial.

Inflorescence a dense cylindrical spike.

Nodes and sheaths glabrous-----9. *C. geniculata*.

Nodes appressed-pubescent; sheaths scabrous and sparsely hispid. 10. *C. hispida*.

Inflorescence more or less open or interrupted, or tapering, not a dense cylindrical spike.

Blades commonly 3 cm. wide, tapering into a long petiole-like base. 8. *C. vulpiseta*.

Blades mostly less than 2 cm. wide, not tapering into a petiole-like base.

Spikelets at maturity globose, about as thick as long; bristles, or some of them, 2 cm. long or more.

Sheaths densely long-villous on the collar; blades about 2 cm. wide-----7. *C. impressa*.

Sheaths slightly pilose on the collar; blades about 1 cm. wide -----6. *C. onurus*.

Spikelets ovoid, longer than thick; bristles mostly less than 1 cm. long.

Blades slender, mostly less than 5 mm. broad; spike slender, very narrow-----5. *C. rariflora*.

Blades linear-lanceolate, more than 5 mm. broad; spike interrupted or branched, the branches 1 to 3 cm. long.

4. *C. setosa*.

1. *Chaetochloa barbata* (Lam.).

Panicum barbatum Lam. Tabl. Encycl. 1: 171. 1791.

Panicum costatum Roxb. Fl. Ind. ed. Carey 1: 314. 1820.

Panicum viaticum Salzm.; Doell in Mart. Fl. Bras. 2²: 155. 1877.

A weak-stemmed annual, geniculate at base, with thin scabrous blades and narrow panicles of numerous pale racemes. In small specimens the plaiting of the blades is sometimes obscure.

A weed in open and waste ground from the West Indies to Brazil, introduced, a native of the tropics of Asia. Originally described from Mauritius. *Panicum costatum* was described from India, *P. viaticum* from Brazil. Grisebach¹ misapplies the name *P. flavescens* Swartz (a synonym of *P. fasciculatum* Swartz) to this species. Called "Mary grass" in Tobago.

Jamaica, Haiti, Porto Rico, Antigua, Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, Grenada, Barbados, Trinidad, and Tobago.

2. *Chaetochloa sulcata* (Aubl.) Hitchc. Contr. U. S. Nat. Herb. 17: 260. 1913.

GAMALOTE.

Panicum sulcatum Aubl. Pl. Guian. 1: 50. 1775.

A tall cespitose perennial with compressed culms and sheaths, the internodes sulcate on the side toward the sheath, thin strongly plaited blades commonly 50 cm. long and 5 cm. wide, and elongate narrow panicles with slender bristles several times longer than the spikelets.

Moist woods, Mexico to Trinidad, Tobago, and Brazil. Originally described from British Guiana. In Trinidad this species is a troublesome weed in cacao groves.

3. *Chaetochloa palmifolia* (Willd.).

Panicum palmifolium Willd.; Poir. in Lam. Encycl. Suppl. 4: 282. 1816.

Panicum plicatum haitiense Kunth; Griseb. Fl. Brit. W. Ind. 547. 1864.

On the average taller than the preceding, the sheaths hispid, blades larger, panicle larger, the numerous long slender branches drooping.

Rocky woods and shady banks, often growing in large colonies, apparently introduced in the West Indies. Originally described from India. The varietal name ascribed by Grisebach to Kunth was probably a herbarium name. It is not found in any of Kunth's works so far as we know. The name *Panicum plicatum* Lam. has been applied to this species by many authors, *P. palmifolium* Willd. being based upon *P. plicatum* as described by Willdenow.² *Panicum palmaefolium* Koen.,³ an earlier nomen nudum, is probably the same species. In Tobago this grass is called "gamalote." Like *Chaetochloa sulcata* it is a weed in cacao groves. The former species, however, is rare in Tobago.

Jamaica, Guadeloupe, Dominica, Martinique, St. Vincent, Grenada, Trinidad, and Tobago.

4. *Chaetochloa setosa* (Swartz) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Panicum setosum Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Panicum caudatum Lam. Tabl. Encycl. 1: 171. 1791.

Panicum brachiatum Polr. in Lam. Encycl. Suppl. 4: 282. 1816.

Setaria elongata Spreng.; Schult. Mant. 2: 280. 1824.

Panicum onurus Willd.; Nees, Agrost. Bras. 251. 1829, as synonym.

¹ Fl. Brit. W. Ind. 547. 1864.

² Enum. Pl. 1033. 1809.

³ Naturf. 23: 208. 1788.

Setaria brachiata Kunth, Rév. Gram. 1: 47. 1829.

Panicum paractenioides Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 219. 1834.

Panicum dumetorum A. Rich.; Steud. Syn. Pl. Glum. 1: 49. 1854.

Panicum restitutum Steud. Syn. Pl. Glum. 1: 53. 1854.

Setaria setosa var. *caudata* Griseb. Fl. Brit. W. Ind. 555. 1864.

Pennisetum swartzii F. Muell. Fragm. 8: 110. 1873.

A slender, wiry, sparingly branching, tufted perennial, the culms and sheaths compressed; blades mostly not over 20 cm. long, pubescent or scabrous; panicles pale, tapering to a slender summit, the branches erect, ascending, or sometimes divergent, the lower commonly 1 to 1.5 cm. long, sometimes as much as 3 cm. long, somewhat remote. One form of this species is more wiry, rigid or woody at base, often decumbent and rooting at the nodes, the branches erect or divergent, the panicles open, with distant slender often reflexed branches. This is found on dry brushy hillsides under more xerophytic conditions. Numerous intermediate specimens connect this form with typical *C. setosa*. This form was described as *Panicum brachiatum*, *P. paractenioides*, and *P. dumetorum*, the first from the Antilles, the second from Crab Island (Vieques), the third from Santo Domingo. The following Porto Rican specimens represent this form: *Britton & Wheeler* 233, from Culebra; *Chase* 6519, 6536, from Guanica; *Hess* 426, from Desecheo; also *Hitchcock* 9315, from Kingston, Jamaica.

Dry or rocky woods, West Indies to Brazil. Originally described from Jamaica. *Panicum caudatum* was described from Brazil and Cayenne. The type of *Setaria elongata* (and of *Panicum restitutum*) is from Santo Domingo, collected by Bertero. Through the courtesy of Dr. Urban we have been able to examine the specimen in the Willdenow Herbarium (no. 18813) mentioned by Nees as "*Panicum onurus* Willd. Herb." This specimen is *Chaetochloa setosa* (Swartz) Scribn. and is not the species described by Grisebach¹ and others as *Setaria onurus*. Nees's description of *Panicum setosum* Swartz var. β , under which *Panicum onurus* Willd. Herb. is cited as a synonym, is based upon the second specimen cited, namely, one collected in Monte Video by Sellow. The Sellow specimen is *Setaria onurus* as understood by Grisebach (see no. 7). Richard² described *C. setosa* as *Setaria macrostachya*.

Bahamas (Water Cay), Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, St. Thomas, St. Jan, St. Croix, Guadeloupe, and Trinidad.

5. *Chaetochloa rariflora* (Mikan).

Setaria rariflora Mikan; Trin. in Spreng. Neu. Entd. 2: 78. 1821.

More slender than the preceding, the blades averaging longer and narrower, the spikelike panicle very slender, the short branches appressed, the lower rather distant.

Sterile brushy hills, West Indies to Brazil, whence originally described. This species has usually been referred to *Setaria caudata* (Lam.) Roem. & Schult., the type of which, however, belongs to *Chaetochloa setosa*.

Porto Rico (Boqueron), St. Thomas, St. Croix, Antigua, and St. Vincent.

6. *Chaetochloa onurus* (Willd.) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 27. 1900.

Panicum onurus Willd.; Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 226. 1834.

Setaria onurus Griseb. Fl. Brit. W. Ind. 555. 1864.

¹ Fl. Brit. W. Ind. 555. 1864.

² In Sagra, Hist. Cuba 11: 309. 1850.

Tufted, erect, commonly 1 meter tall, the culms and sheaths compressed, the numerous elongate blades mostly 0.8 to 1.2 cm. wide, usually reaching beyond the base of the rather loose panicle of large globose spikelets and long flexuous bristles.

Savannas, rocky banks, and open woods, West Indies to Uruguay. Originally described from Montevideo. *Panicum onurus* was first mentioned by Nees¹ as a synonym under *P. setosum* var. β “(*P. onurus*, Willd. Herb.—ex Humboldtianis)”. Nees gives as the “habitat” of β the following: “in regno Mexicano (ab Humb.—Vidi in Herb. Willd. In Monte Video. (Sellow.) (Vidi in Herb. Reg. Berol.)” The Willdenow specimen is *Chaetochloa setosa*, but the Sellow specimen belongs to the species later described by Trinius as *Panicum onurus*. Although Trinius, in the work cited above, credits the name to Willdenow (“*Panicum onurus* Willd. hb.”), he describes the Sellow specimen instead of the Willdenow specimen. The name *Panicum onurus* was first technically published by Trinius. We take the Sellow specimen from Montevideo as the type, this being the one described, rather than the Willdenow specimen which Trinius did not see, though, following Nees, he supposed the two specimens to belong to the same species.

Cuba, Jamaica, and Barbados.

7. *Chaetochloa impressa* (Nees).

Panicum impressum Nees, Agrost. Bras. 247. 1829.

Panicum sphaerocarpum Salzm.; Steud. Syn. Pl. Glum. 1: 51. 1854, not Ell. 1816.

Panicum amphibolum Steud. Syn. Pl. Glum. 1: 51. 1854.

Setaria biconvexa Griseb. Fl. Brit. W. Ind. 555. 1864.

Chaetochloa salzmänniana Hitchc. Contr. U. S. Nat. Herb. 17: 265. 1913.

Similar to the preceding, the culms taller, less compressed, the blades broader, the panicle branches 2 to 3 cm. long, at maturity ascending at a uniform angle, the spikelets mostly along the lower side.

Copses and dry open woods, southern Mexico to western Trinidad and Brazil. Originally described from the Province of Bahia, Brazil. The type of *Panicum sphaerocarpum* Salzm. and *Chaetochloa salzmänniana* and the type of *Panicum amphibolum* come from Bahia. *Setaria biconvexa* was described from Trinidad.

8. *Chaetochloa vulpiseta* (Lam.).

Panicum vulpisetum Lam. Encycl. 4: 735 (err. typ. 745). 1798.

Setaria vulpiseta Roem. & Schult. Syst. Veg. 2: 495. 1817.

Panicum amplifolium Steud. Syn. Pl. Glum. 1: 53. 1854.

In large clumps about 1 meter tall, the culms strongly compressed, the numerous thin blades commonly 50 cm. long and 3 cm. wide, tapering into a long petiole-like base, the bristly spikelike panicle 20 to 30 cm. long, about 2.5 cm. thick, tapering to both ends.

Copses and brushy slopes, West Indies and Central America to Paraguay. Originally described from Santo Domingo. *Panicum amplifolium* is based upon *Keppler* 1411 from Surinam. Lamarck, Grisebach, and others cite a plate in Sloane,² which, however, represents *Imperata contracta* (H. B. K.) Hitchc. (*I. caudata* Trin.).

Porto Rico (between Rio Piedras and Trujillo Alto), Trinidad, and Tobago.

9. *Chaetochloa geniculata* (Lam.) Millsp. & Chase, Field Mus. Bot. 3: 37. 1903.

Panicum geniculatum Lam. Encycl. 4: 727 (err. typ. 737). 1798.

Setaria geniculata Beauv. Ess. Agrost. 51, 178. 1812.

¹ See note under *Chaetochloa setosa*, p. 349 of the present article.

² Voy. Jam. 1: pl. 70. f. 1. 1707.

Setaria purpurascens H. B. K. Nov. Gen. & Sp. 1: 110. 1816.

Panicum imberbe Poir. in Lam. Encycl. Suppl. 4: 272. 1817.

Setaria berteroniana Schult. Mant. 2: 276. 1824.

Panicum penicillatum Nees, Agrost. Bras. 242. 1829.

Setaria venteneti Kunth, Rév. Gram. 1: 251. pl. 37. 1829.

Panicum berteronianum Steud. Syn. Pl. Glum. 1: 50. 1854.

Setaria glauca var. *imberbis* Griseb. Fl. Brit. W. Ind. 554. 1864.

Setaria glauca var. *penicillata* Griseb. Fl. Brit. W. Ind. 554. 1864.

Chaetochloa imberbis Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Chaetochloa imberbis geniculata Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 12. 1900.

Chaetochloa purpurascens Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 13. 1900.

*Chaetochloa venteneti*¹ Nash in Kearney, Contr. U. S. Nat. Herb. 5: 515. 1901.

Setaria glauca geniculata Urban, Symb. Antill. 4: 96. 1903.

Setaria glauca purpurascens Urban, Symb. Antill. 4: 96. 1903.

Tufted, the slender compressed culms erect, geniculate at base, or sometimes spreading, the blades mostly 5 to 8 mm. wide, the long-exserted dense spikelike yellow or purplish panicle 5 to 10 cm. long, 6 to 8 mm. thick, excluding the bristles. The bristles vary in length and color. Early in the season they are longer than the spikelets, but on later spikes they may be shorter than the spikelets.

Open ground and waste places, eastern United States through Mexico and the West Indies to Argentina. An excellent pasture grass. Originally described from Guadeloupe. The type locality of *Setaria venteneti* is Porto Rico, of *Panicum penicillatum*, Brazil. Poiret gives North America and Brazil as the source of *Panicum imberbe*. Richard¹ refers this species to *Setaria flava* Kunth. Called in Cuba "rabo de gato," "guisasillo," and "hierba de venado."

Common throughout the West Indies.

10. *Chaetochloa hispida* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 25. f. 13. 1900.

Setaria hispida Schum. Just's Bot. Jahresb. 28¹: 417. 1902.

Culms slender, compressed, 60 to 100 cm. tall, roughish, at least toward the summit; sheaths and blades very scabrous, sparsely hispid; panicle 8 to 15 cm. long, the bristles much exceeding the spikelets. This rare species was described as being annual, but from the two known specimens we judge it to be perennial.

In coral or limestone sands, southern Florida and Cuba. Described from Cuba, the type and only Cuban specimen collected by Wright (without number) in January, 1865, in sandy pine woods, La Grifa, Pinar del Río.

11. *Chaetochloa lutescens* (Weigel) Stuntz, U. S. Dept. Agr. Bur. Pl. Ind. Inv. Seeds 31: 83. 1912.²

Panicum lutescens Weigel, Obs. Bot. 20. 1772.

Much like *C. geniculata* in appearance but annual.

A weed in the garden at Cinchona, Jamaica. Common in fields and waste places in the eastern United States. Introduced from Europe, whence origi-

¹ In Sagra, Hist. Cuba 11: 309. 1850.

² This is the species that has been known as *Panicum glaucum*, *Setaria glauca*, and *Chaetochloa glauca*. Stuntz has shown that *Panicum glaucum* L. should apply to the species usually known as *Pennisetum americanum* (L.) Schum., *Pennisetum glaucum* (L.) R. Br.

nally described. In the United States this is called "yellow foxtail" or "pigeon grass."

12. *Chaetochloa magna* (Griseb.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Setaria magna Griseb. Fl. Brit. W. Ind. 554. 1864.

A robust annual, 2 meters or more tall, the succulent culms as much as 1 cm. thick, the blades commonly 50 cm. long, 1.5 to 2.5 cm. wide, the thick dense bristly spike 20 to 30 cm. long, tapering to both ends, the second glume nearly equaling the smooth fruit.

Swamps and wet soil, southeastern United States, West Indies, and Panama. Originally described from Jamaica.

Bermuda, Jamaica (Black River), Porto Rico (Laguna del Tortuguero), and Guadeloupe.

13. *Chaetochloa viridis* (L.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

GREEN FOXTAIL.

Panicum viride L. Syst. Nat. ed. 10. 2: 870. 1759.

Setaria viridis Beauv. Ess. Agrost. 51, 178. 1812.

Annual, branching from the base, commonly not more than 50 cm. tall; spikes 3 to 10 cm. long.

A weed in waste and cultivated ground. Common in the United States, introduced from Europe, whence originally described. Found in Bermuda. Said by Grisebach¹ to be naturalized in Jamaica.

CHAETOCHLOA ITALICA (L.) Scribn. (*Setaria italica* Beauv.), the common millet, is said by Grisebach¹ to be naturalized in Jamaica. In the herbarium of the New York Botanical Garden there is a specimen from Martinique (Duss 1315).

14. *Chaetochloa verticillata* (L.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Panicum verticillatum L. Sp. Pl. ed. 2. 2: 82. 1762.

Setaria verticillata Beauv. Ess. Agrost. 51. 1812.

Culms slender, compressed, geniculate and branching below; blades thin, lanceolate-linear; spikes short, green or purplish, the slender bristles retrorsely barbate.

A weed in fields and waste places, temperate and warmer regions of both hemispheres, introduced in America. Called in Cuba "pega-pega" and "amor seco." Originally described from southern Europe and the Orient. Found in Bermuda, Cuba (Habana), and Martinique.

15. *Chaetochloa tenacissima* (Schrad.).

Setaria tenacissima Schrad.; Schult. Mant. 2: 279. 1824.

Panicum tenacissimum Nees, Agrost. Bras. 238. 1829.

Culms slender but strong, 1 meter or more tall, leaning or clambering, the long narrow blades very scabrous, the spikes 10 to 15 cm. long, with long slender divaricate bristles and small spikelets nearly black at maturity.

Brushy hillsides, Guatemala to Brazil, whence originally described; also in Porto Rico (Utuado, *Sintenis* 6498), and Trinidad (Port of Spain, *Hitchcock* 10002).

16. *Chaetochloa scandens* (Schrad.) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 17. 1900.

Setaria scandens Schrad.; Schult. Mant. 2: 279. 1824.

¹ Fl. Brit. W. Ind. 554. 1864.

Repeatedly branching at the geniculate lower nodes, the slender culms usually 20 to 50 cm. tall, the thin blades sparsely pilose, the slender spikes 2 to 8 cm. long, about 4 mm. thick, interrupted below, the bristles ascending, exceeding the small turgid spikelets only 2 or 3 mm.

Open ground Guatemala to Paraguay; also Jamaica. Originally described from a garden specimen in Vienna, the native country unknown. A weed in fields and waste places in Jamaica, apparently introduced.

48. PARATHERIA Griseb.

Inflorescence a narrow spike, the solitary spikelets appressed to slender erect branches, the ends of the branches produced beyond the spikelets as slender awns, the articulation at the base of the branch, this forming a sharp callus below the attached acuminate spikelet; glumes minute or obsolete; sterile lemma equaling the subindurate fruit.

1. *Paratheria prostrata* Griseb. Cat. Pl. Cub. 236. 1866.

• *Chamaeraphis parvigluma* Munro; Wright & Sauv. Anal. Acad. Cien. Habana 8: 208. 1871, nomen nudum.

Panicum leptochyrium Doell in Mart. Fl. Bras. 2^a: 150. 1877.

A tufted decumbent perennial with sparingly branching culms 20 to 60 cm. long, pubescent nodes, sheaths, and blades, and numerous slender spikes with erect bristles and narrow acuminate spikelets about 8 mm. long.

Low moist ground near Hanábana, Cuba, whence originally described from a Wright collection in 1865, and Isle of Pines (*Curtiss* 461); also in Brazil. *Panicum leptochyrium* described from Santarem.

49. PENNISETUM Pers.

Spikelets 1 to 3 together, subtended by a whorl of slender bristles (sterile branchlets), subsessile along a common axis forming bristly spikes, the bristles falling attached to the lanceolate spikelet.

Bristles naked.

Spike not over 5 cm. long, loose; spikelets about 4 mm. long.

1. *P. domingense*.

Spike about 10 cm. long, compact; spikelets about 2 mm. long.

2. *P. antillarum*.

Bristles or some of them plumose.

Culms low and spreading; involucre with a turbinate naked base.

5. *P. ciliare*.

Culms erect, tall and rather stout; involucre with no naked base.

Spikelets about 3 mm. long, solitary in the sessile involucre.

3. *P. setosum*.

Spikelets about 5 mm. long, 2 or more in the peduncled involucre.

4. *P. orientale triflorum*.

1. *Pennisetum domingense* (Spreng.) Spreng. Syst. Veg. 1: 302. 1825.

Gymnothrix domingensis Spreng.; Schult. Mant. 2: 284. 1824.

A tall glabrous perennial with elongate rigid internodes, fascicled or solitary branches, short papery sheaths, small involute blades, and small loose pale spikes.

Dry wooded slopes, eastern Cuba and Santo Domingo. Originally described from the latter.

2. *Pennisetum antillarum* (Poir.) Desv. Opusc. 76. 1831.

Panicum antillarum Poir. in Lam. Encycl. Suppl. 4: 275. 1816.

Saccharum? *antillarum* Roem. & Schult. Syst. Veg. 2: 877. 1817.

Setaria antillarum Kunth, Rév. Gram. 1: 46. 1829.

This little-known species is distinguished by the slender spikes with spikelets about 2 mm. long, solitary in the involucre, the bristles naked, one being 2 or 3 times as long as the spikelet, the others about as long as the spikelet. The type specimen in the Florence Herbarium is said to have come from the "Antilles." We have seen no other specimens.

3. *Pennisetum setosum* (Swartz) Rich.; Pers. Syn. Pl. 1: 72. 1805.

Cenchrus setosus Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Pennisetum alopecuroides Desv.; Hamilt. Prodr. Pl. Ind. Occ. 11. 1825.

Pennisetum erubescens Desv.; Hamilt. Prodr. Pl. Ind. Occ. 11. 1825.

Pennisetum hamiltonii Steud. Syn. Pl. Glum. 1: 108. 1854.

A tall leafy branching perennial, erect or ascending from a geniculate base, the long flat blades pubescent or scabrous, the purplish spikes 10 to 15 cm. long, the long slender bristles at maturity spreading horizontally or slightly reflexed.

Grassy slopes and open woods, Mexico and West Indies to South America; also in tropical Asia and Africa. Originally described from the West Indies, the exact locality not indicated. *Pennisetum alopecuroides* was described from the West Indies, *P. erubescens* from St. Thomas. *Pennisetum hamiltonii* was based on *P. alopecuroides*.

Cuba (San Juan de Buenavista), St. Eustacius, Guadeloupe, Dominica, Martinique, St. Vincent, Grenada, Barbados, Trinidad, and Tobago.

4. *Pennisetum orientale triflorum* (Nees) Stapf; Hook. f. Fl. Brit. Ind. 7: 86. 1896.

Pennisetum triflorum Nees; Steud. Syn. Pl. Glum. 1: 107. 1854.

Culms ascending from a hard knotted crown with numerous short leafy shoots; spikes commonly 20 cm. long, the spreading turbinate involucre very feathery.

Naturalized around Cinchona, Jamaica, and escaped from cultivation on the grounds of the experiment station in Trinidad; native of India. Originally described from Nepal.

5. *Pennisetum ciliare* (L.) Link, Hort. Berol. 1: 213. 1823.

Cenchrus ciliaris L. Mant. Pl. 302. 1771.

Pennisetum cenchroides Rich. in Pers. Syn. Pl. 1: 72. 1805.

A low, spreading perennial, with short spikes of readily deciduous involucre. Originally described from Africa. Introduced in Porto Rico (La Vigia, Ponce).

50. CENCHRUS L.

SAND BUR.

Spikelets 1 to 4 together, subtended and surrounded by a spiny bur formed of adnate sterile branches, the burs sessile along a common axis, falling with the spikelets and permanently inclosing them; spikelets acuminate, the first glume sometimes obsolete.

Called also "burgrass," and, in Cuba, "guizazo."

Plants perennial.

Bristles of bur separate nearly to the base; blades 20 cm. or more long.

1. *C. myosuroides*.

Bristles united at base; blades 2 to 3 cm. long-----2. *C. distichophyllus*.

Plants annual.

Involucre with flattened spines, no ring of slender bristles at base.

Culms erect; burs glabrous-----5. *C. gracillimus*.

Culms decumbent; burs pubescent.

Spines erect or ascending; burs, including spines, less than 5 mm. wide -----6. *C. microcephalus*.

Spines spreading; burs, including spines, commonly 1 cm. or more wide.

Burs, excluding spines, 5 to 6 mm. wide, finely pubescent.

3. *C. carolinianus*.

Burs, excluding spines, 8 to 10 mm. wide, densely woolly.

4. *C. tribuloides*.

Involucre with a ring of slender bristles at base.

Burs, excluding bristles, 5 to 7 mm. wide, not densely crowded; involucre lobes erect-----7. *C. echinatus*.

Burs, excluding bristles, not over 4 mm. wide, numerous, crowded in a long spike; involucre lobes interlocking-----8. *C. viridis*.

1. *Cenchrus myosuroides* H. B. K. Nov. Gen. & Sp. 1: 115. *pl.* 35. 1816.

Panicum cenchroides Ell. Bot. S. C. & Ga. 1: 111. 1816.

Pennisetum pungens Nutt. Gen. Pl. 1: 54. 1818.

Cenchrus elliottii Kunth, Rév. Gram. 1: 51. 1829.

Cenchropsis myosuroides Nash in Small, Fl. Southeast. U. S. 109. 1903.

Glabrous; culms sparingly branching, woody, often 2 meters tall; spikes dense, cylindrical, 12 to 20 cm. long, about 8 mm. thick, the erect involucre bristles not exceeding the spikelet.

Sandy soil, Georgia and Florida, Mexico and West Indies to South America. Originally described from Batabanó, Cuba. *Panicum cenchroides* (on which *P. pungens* and *C. elliottii* are based) was described from Georgia.

Bahamas (Inagua, Turks Island), Cuba (Santiago de Cuba), Haiti, and Porto Rico (Cabo Rojo, Mona Island).

2. *Cenchrus distichophyllus* Griseb. Cat. Pl. Cub. 234. 1866.

Culms tufted, wiry, with short internodes, overlapping sheaths, and spreading involucre rigid pungent blades, the long-exserted spike about 3 cm. long, the involucre bristles squarrose.

Sandy pine barrens, western Cuba (Guanes, Wright 3475, the type specimen, Laguna Jovero, Shafer 10717, and San Julián, León 6941).

3. *Cenchrus carolinianus* Walt. Fl. Carol. 79. 1788.

Cenchrus echinatus forma *longispina* Hack. Allg. Bot. Zeitschr. 9: 169. 1903.

Decumbent, freely branching at the base, the flowering culms ascending; sheaths loose; blades firm, commonly folded; spikes short-exserted, of 6 to 12 burs.

Sandy soil, throughout the United States, south to South America. Originally described from South Carolina, the forma *longispina* from Connecticut. Has been included by many authors under *Cenchrus tribuloides*.

Bahamas (Andros, Anguilla Isles, Water Key, New Providence), Cuba, Jamaica, Porto Rico, St. Thomas, Antigua, and Guadeloupe.

4. *Cenchrus tribuloides* L. Sp. Pl. 1050. 1753.

Cenchrus tribuloides var. *macrocephalus* Doell in Mart. Fl. Bras. 2²: 312. 1877.

Cenchrus macrocephalus Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 110. f. 406. 1899.

Similar to no. 3, rather stockier, the burs larger, woolly.

Sandy sea beaches, New Jersey to Florida, Bermuda, the Bahamas (New Providence), and Brazil. Originally described from the coast of Virginia. *Cenchrus tribuloides* var. *macrocephalus* was described from Brazil.

5. *Cenchrus gracillimus* Nash, Bull. Torrey Club 22: 299. 1895.

Differs from *C. carolinianus* in the erect more slender culms, longer narrow blades, and smaller glabrous, less crowded burs.

Sandy soil, Florida and Jamaica (southern Manchester). Originally described from central Florida.

6. *Cenchrus microcephalus* Nash, sp. nov.

Culms compressed, slender, 3 to 7 cm. long, ascending from a decumbent base; blades commonly 12 to 15 cm. long, about 2 mm. wide, sparsely pilose on the upper surface; burs about 10, scarcely 5 mm. long, erect, smaller than those of any other species of the West Indies, the flattened spines ciliate; spikelets usually 2 in each bur, 4 mm. long.

Type specimen in the herbarium of the New York Botanical Garden, collected in saline meadows, Berry Island, Bahamas, by Britton & Millspaugh (no. 2249). Known only from the Berry Islands, a second specimen collected on Frozen Cay (Britton & Millspaugh 2211).

7. *Cenchrus echinatus* L. Sp. Pl. 1050. 1753.

Cenchrus brevisetus Fourn. Mex. Pl. 2: 50. 1886.

Culms usually about 50 cm. long, ascending from a decumbent base, branching below; blades flat, thin, usually elongate, 5 to 10 mm. wide; spike commonly 5 to 7 cm. long. This species is extremely variable in the size of the burs and length of bristles. Small-burred specimens may be distinguished from *C. viridis* by the fewer, less-crowded burs and stiffer bristles.

Open ground and waste places. A common weed throughout the warmer parts of America. Originally described from Jamaica and Curaçao. *Cenchrus brevisetus* was described from Mexico.

To be found on probably all of the West Indian islands.

CENCHRUS INSULARIS Scribn. in Millsp. Field Mus. Bot. 2: 26. 1900. From Mexico to northern South America. Originally described from Alacrán Shoals off the coast of Yucatán. A single immature specimen that may belong to this species comes from Chacachacare Island, Trinidad (*Hitchcock* 10056). This species differs from *C. echinatus* in having larger burs with a densely villous base.

8. *Cenchrus viridis* Spreng. Syst. Veg. 1: 301. 1825.

Cenchrus echinatus var. *viridis* Spreng.; Griseb. Fl. Brit. W. Ind. 556. 1864.

Taller than *C. echinatus*, more upright, the spikes commonly 10 cm. long.

Open ground and waste places, Florida to Central America and the West Indies. Originally described from Guadeloupe. To be found on probably all of the West Indian islands.

51. *STENOTAPHRUM* Trin.

Spikelets 2 or 3 together in reduced racemes, these embedded in cavities along one side of a broad flat thickened corky articulate axis, the spikelets falling attached to the joints; spikelets strongly convex on the inner side; first glume minute.

1. *Stenotaphrum secundatum* (Walt.) Kuntze, Rev. Gen. Pl. 2: 794. 1891.

ST. AUGUSTINE GRASS.

Ischaemum secundatum Walt. Fl. Carol. 249. 1788.

Rottboellia stolonifera Poir. in Lam. Encycl. 6: 310. 1804.

Stenotaphrum americanum Schrank, Hort. Monac. pl. 98. 1811-1818.

Stenotaphrum sarmentosum Nees, Agrost. Bras. 93. 1829.

Stenotaphrum glabrum var. *americanum* Doell in Mart. Fl. Bras. 2^a: 300. 1877.

Stenotaphrum dimidiatum var. *americanum* Hack. in Stuck. Anal. Mus. Nac. Buenos Aires 21: 57. 1911.

An extensively creeping glabrous perennial, the stolons with long internodes and short leafy branches, the sheaths equitant, the blades short, obtuse; flowering culms 10 to 30 cm. tall, the blades commonly 10 to 15 cm. long; spikes terminal and axillary, 5 to 10 cm. long.

Open grass land, at low altitudes, especially near the coast, southern United States to South America. An excellent pasture grass. Originally described from South Carolina. *Rottboellia stolonifera* was described from Porto Rico. To be found on probably all of the West Indian islands. In Cuba called "camalote," "cambute," "gramón de costa," and "cañamazo amargo."

52. OLYRA L.

Plants monœcious; inflorescence paniculate; pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches; pistillate spikelets rather large; first glume wanting; second glume and sterile lemma herbaceous, caudate-acuminate; fruit bony-indurate; staminate spikelets readily deciduous; glumes and sterile lemma wanting, the lemma and palea membranaceous.

Fruit smooth and shining; plants usually over 3 meters tall-----1. *O. latifolia*.

Fruit clothed with thick silky hairs at base and summit; plants less than 1 meter tall-----2. *O. ciliatifolia*.

1. *Olyra latifolia* L. Syst. Nat. ed. 10. 2: 1261. 1759.

Olyra paniculata Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Glabrous perennial, bamboo-like in aspect, commonly 5 meters tall, the strong hollow culms sometimes 1 cm. thick, erect and unsupported, the summit only arching (or weaker culms leaning among brush), the lower half to two-thirds simple and naked, the short sheaths bladeless or nearly so, the elongate internodes blotched with dull purple, branching from the upper nodes, the branches commonly fascicled, divaricate, often 1 meter long, sometimes again branching; blades convolute in the bud, spreading, flat, firm, unsymmetrically lanceolate-oblong, abruptly acuminate, commonly 20 cm. long and 5 cm. wide, those of the ultimate branches smaller, the lowermost on both primary culm and branches rudimentary; panicles 10 to 15 cm. long, about two-thirds as wide, those of the secondary branches reduced, the branches stiffly ascending or spreading, each bearing a single large long-acuminate pistillate spikelet at the thickened summit and several small slender-pedicelled staminate spikelets along the rachis.

Copses and shady banks, Mexico and West Indies to South America. Originally described from Jamaica; *O. paniculata* also described from Jamaica. In Cuba this is one of the grasses called "tibisi."

A scarcely distinct form has been named *O. arundinacea* H. B. K.¹ (*O. latifolia* var. *arundinacea* Griseb.²) This is distinguished by its glabrous sheaths and more loosely flowered green panicle. It is found in the West Indies chiefly from Porto Rico to Trinidad and extends to Brazil. Originally described from Colombia. The typical form of *O. latifolia*, with hispid sheaths and denser purple panicle, is found chiefly in Cuba and Jamaica, but extends from Mexico to Brazil. The differences mentioned above are best seen in the primary culms and panicles.

¹ Nov. Gen. & Sp. 1: 197. 1816.

² Fl. Brit. W. Ind. 535. 1864.

2. *Olyra ciliatifolia* Raddi, Agrost. Bras. 19. 1823.

Much smaller, the culms tufted, no strong main cane as in *Olyra latifolia*. Specimens of this lacking the base resemble specimens of *O. latifolia* consisting of branches only, but may be distinguished by the smaller narrower panicle and pubescent fruit.

Rich woods, Trinidad (Port of Spain) to Brazil. Originally described from Rio de Janeiro. Referred by Grisebach¹ to *O. semiovata* Trin.

53. LITHACHNE Beauv.

Plants monœcious; spikelets in small axillary panicles, these with a single pistillate spikelet at the summit and 1 to several staminate spikelets below; terminal panicle if present wholly staminate; first glume of pistillate spikelet wanting; second glume and sterile lemma herbaceous, long-acuminate; fruit bony-indurate, laterally subcompressed, the lemma greatly swollen or gibbous on the back, the narrow palea slightly convex; staminate spikelets reduced to the lemma and palea.

Blades 1.5 to 3 cm. wide-----1. *L. pauciflora*.
Blades less than 5 mm. wide-----2. *L. pineti*.

1. *Lithachne pauciflora* (Swartz) Beauv.; Poir. Dict. Sci. Nat. 27: 60. 1823.

Olyra pauciflora Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Olyra axillaris Lam. Encycl. 4: 547. 1797.

Lithachne axillaris Beauv. Ess. Agrost. 166. pl. 24. f. 11. 1812.

A tufted perennial, the slender hard culms geniculate and naked below, ascending and leafy above, commonly 30 to 50 cm. tall, the flat asymmetrical rhombic-lanceolate acuminate spreading blades usually 5 to 8 cm. long, crowded toward the summit, the small axillary panicles produced from the upper sheaths.

Moist woods up to about 2,000 meters, Mexico, Central America, and the West Indies. Originally described from Jamaica. *Olyra axillaris* was described from Cayenne. In Cuba called "pito enano."

Cuba, Jamaica, Porto Rico, Antigua, Guadeloupe, and Martinique.

2. *Lithachne pineti* (Wright) Chase, Proc. Biol. Soc. Washington 21: 182. 1908.

Olyra pineti Wright; Griseb. Mem. Amer. Acad. n. ser. 8: 532. 1862.

A tufted perennial, with capillary culms about 20 cm. long, naked below, bearing small flat reflexed blades above, the axillary racemes bearing 1 to few spikelets.

Only known from the type collection, Wright 1536, from "eastern Cuba."

54. RADDIA Bertol.

Plants monœcious; staminate and pistillate spikelets in distinct small panicles, the staminate terminal or from the upper nodes, the pistillate axillary; first glume of the pistillate spikelets wanting, the second glume and sterile lemma membranaceous, acuminate; fruit dorsally subcompressed, bony-indurate.

Fruit pubescent; blades 5 to 7 cm. long-----1. *R. biformis*.
Fruit glabrous; blades not over 4 cm. long.

Blades about 3 cm. long; fruit 6 to 7 mm. long-----2. *R. urbaniana*.

Blades 1 to 1.5 cm. long; fruit about 2 mm. long-----3. *R. nana*.

1. *Raddia biformis* sp. nov.

Perennial, rhizomatous, 15 to 30 cm. high; culms cespitose, simple, slender, ascending or erect from strongly geniculate lower nodes, striate-sulcate, with a

¹ Fl. Brit. W. Ind. 535. 1864.

stripe of dense short retrorse pubescence, broadening toward the summit, the sterile culms naked below and bearing 5 to 7 crowded leaves at the summit, the middle internodes elongate, the upper and lower reduced; nodes prominent, puberulent; sheaths not over 15 mm. long, the lower and those of the fertile culms with minute blades or sometimes bladeless, retrorsely puberulent along the margin and toward the summit, the upper overlapping ones more or less hirsute and with a ring of stiff hairs at the summit; ligule obsolete; blades (in dried specimens) grayish green, paler beneath, rather firm, flat, 3 to 7 cm. long, 6 to 12 mm. wide, lanceolate, rounded at the base, the apex acute, glabrous on the upper surface or with a few scattered hairs, sparsely hispid beneath, and bearing stiff hairs on the very short petiole; staminate inflorescence consisting of small spikelike panicles of 2 to 5 spikelets borne in the upper axils and at the ends of the leafy culms, the lateral spikelets staminate, subsessile, about 3 mm. long, 0.8 mm. wide, acuminate, minutely puberulent, strongly nerved, the terminal spikelets in appearance like the pistillate ones, 7 to 8 mm. long, on short obconic pedicels, neutral or with a rudimentary pistil; pistillate inflorescence consisting of small spikelike panicles of 2 or 3 fertile spikelets on short thickened pedicels and a few more or less rudimentary subsessile staminate ones borne at the ends and in the upper slightly inflated sheaths of low slender naked culms arising from the base; fertile spikelets on short thickened pedicels, 7 to 8 mm. long, 2 mm. wide, subterete, oblong-elliptic; glume and sterile lemma subequal, puberulent, strongly nerved, acuminate into short setaceous scabrous tips about 1 mm. long; fruit 6.5 mm. long, about 1.5 mm. wide, elliptic, apiculate, becoming lead-colored at maturity, clothed with soft silky appressed hairs, a glabrous stripe down the back, the margins of the lemma nearly meeting over the palea.

Type in the U. S. National Herbarium, no. 865556, collected in a rocky ravine, near Caparo, Trinidad, September 18, 1908, by W. E. Broadway (no. 2375). "A dwarf grass in sandy soil on slopes under the shade of large forest trees."

Raddia biformis differs from all the known species of the genus in having culms of two forms, the one with an incompletely staminate, the other with an incompletely pistillate inflorescence, and further in having pubescent fruits.

Shady forest floors, Trinidad (Tabaquite, *Hitchcock* 10127, St. Anns, *Trin. Bot. Gard. Herb.* 5892).

2. *Raddia urbaniana* sp. nov.

Perennial; culms cespitose (the tufts sometimes connected by a slender rhizome), 20 to 45 cm. high, slender, ascending from more or less geniculate lower nodes, striate-sulcate, bearing a narrow stripe of dense short retrorse pubescence, otherwise glabrous, naked below, with distant nearly bladeless sheaths, toward the summit bearing 12 to 24 approximate leaves with overlapping sheaths and distichous spreading blades; sheaths not over 1.5 cm. long, hispidulous along the overlapping margin; ligule minute, fimbriate; blades (in dried specimens) grayish green, thin but firm, flat, glabrous, 2 to 3.5 cm. long, 4 to 8 mm. wide, oblong-lanceolate, rounded at both ends, bearing a scabrous mucronate tip 0.5 mm. long, the petiole less than 1 mm. long; staminate panicles several to many from the axils of the upper sheaths, narrow, few-flowered, the axis and pedicels angled, scabrous, the spikelets 5 to 6 mm. long, acuminate-pointed; pistillate panicles one or two from the middle nodes, bearing 2 to 5 spikelets on short clavate pedicels; spikelets lanceolate, the glume 8 mm. long, much exceeding the fruit, the sterile lemma 5 mm. long, both acuminate-setaceous; fruit 4 mm. long, about 1 mm. wide, bluntly acuminate, white, glabrous.

Type in the U. S. National Herbarium, no. 865554, collected in the center of the island of Tobago, "abundant on the floor of deep forest on mountain,"

December 18, 1912, by A. S. Hitchcock (no. 10267). Specimens of the species were first received from Dr. I. Urban, for whom the species is named in recognition of his work on the West Indian flora.

This species is allied to the small-leaved *Raddia nana*, *R. distichophylla*, and *R. polypodioides*, but differs from them in having larger blades, and in having the fruit exceeded by the glume and sterile lemma.

Only known from Tobago (The Widow, *Broadway* 3004, 4360, and *Eggers* 5841, besides the type collection).

3. *Raddia nana* (Doell) Chase, Proc. Biol. Soc. Washington 21: 185. 1908.

Olyra nana Doell in Mart. Fl. Bras. 2^a: 329. 1877.

A tufted straggling perennial with delicate, nearly simple culms 10 to 30 cm. long, naked below, the small flat oblong-triangular spreading or deflexed blades 10 to 12 mm. long, 5 to 7 mm. wide, bearing at the rounded apex a minute mucronate tip, approximate along the upper part of the culm, the small few-flowered axillary racemes scarcely exerted from the upper sheaths.

Wet sandy savannas, Trinidad (Aripo Savanna, Cumuto Station) to Brazil, whence originally described.

55. MNIOCHLOA Chase.

Plants dioecious; inflorescence a pair of slender racemes, one pistillate, the other staminate, at the summit of a naked culm; pistillate spikelets subsessile; first glume wanting; second glume and sterile lemma subequal, obtuse, or subacute; fruit white, cartilaginous, subindurate; staminate spikelets smaller, reduced to the lemma and palea.

Flowering culms much exceeding the sterile ones; fruit glabrous.

1. *M. pulchella*.

Flowering and sterile culms about equal in height; fruit pubescent.

2. *M. strephioides*.

1. *Mniochloa pulchella* (Griseb.) Chase, Proc. Biol. Soc. Washington 21: 186. pl. 4. 1908.

Digitaria pulchella Griseb. Cat. Pl. Cub. 231. 1866.

Strephium? *pulchellum* Wright, Anal. Acad. Cienc. Habana 8: 202. 1871.

A delicate tufted perennial, the capillary naked flowering culms 10 to 25 cm. tall, ascending from a geniculate base, the racemes 2 to 3 cm. long, the prostrate leafy sterile culms 6 to 10 cm. long, the flat spreading lanceolate-oblong blades 10 to 12 mm. long, about 5 mm. wide.

On precipices, eastern Cuba. Only known from the type collection, *Wright* 3448, from El Yunque de Baracoa, Cuba.

2. *Mniochloa strephioides* (Griseb.) Chase, Proc. Biol. Soc. Washington 21: 186. 1908.

Olyra strephioides Griseb. Cat. Pl. Cub. 229. 1866.

Less delicate than *M. pulchella*, the flowering culms 5 to 8 cm. tall, the racemes 1.5 to 2 cm. long, the sterile leafy culms as much as 20 cm. long.

Damp slopes, western Cuba, whence originally described, *Wright* 3435 being the type specimen. Also found near San Diego de los Baños (*León* 4391, 4572, 4593) and Campo Florido (*León* 4140).

56. PHARUS L.

Spikelets in pairs, appressed along the slender spreading, nearly simple panicle branches, one pistillate, subsessile, the other staminate, pedicellate, much smaller than the pistillate spikelet; fertile lemma subindurate, terete,

clothed, at least toward the beaked apex, with thick uncinuate hairs; blades with fine transverse veins between the longitudinal nerves, petioled (the petiole with a single twist reversing the upper and under surfaces of the blade), the nerves running from midnerve to margin.

Culms creeping at base-----2. *P. parvifolius*.

Culms erect or nearly so.

Fruit pubescent only at tip, slightly exceeding the glumes.

3. *P. latifolius*.

Fruit pubescent all over, 2 to 3 times as long as the glumes---1. *P. glaber*.

1. *Pharus glaber* H. B. K. Nov. Gen. & Sp. 1: 196. 1816.

Pharus brasiliensis Raddi, Agrost. Bras. 21. 1823.

Pharus lancifolius Desv.; Hamilt. Prodr. Pl. Ind. Occ. 8. 1825.

An erect glabrous perennial 50 to 75 cm. tall, with flat oblanceolate acuminate blades commonly 15 to 25 cm. long and 3 to 5 cm. wide, and large open fragile panicles, the few branches stiffly ascending or spreading, the appressed oblong brown spikelets about 1 cm. long, the fruit densely clothed with hooked hairs, the panicles readily breaking up, the pieces attaching themselves by the hooked hairs to passing objects.

Rich woods, Mexico and West Indies to Brazil. Originally described from Venezuela; *P. brasiliensis* described from Rio de Janeiro and *P. lancifolius* from the Antilles. Found throughout the Greater Antilles and in the Lesser Antilles as far south as St. Vincent.

2. *Pharus parvifolius* Nash, Bull. Torrey Club 35: 301. 1908.

Creeping at base, the blades on the average smaller and less broadened upward, otherwise like the preceding.

Rich woods, West Indies. Originally described from Haiti, the type being Nash & Taylor 1482, collected at "Les Roches, a few miles to the west of Plaisance."

Cuba (Banao Hills, Santa Clara, and Loma del Jaguey, Oriente), Jamaica (Ramble, near Claremont), Haiti, Porto Rico (Arecibo), and Trinidad (Tabaquite and Tamana).

3. *Pharus latifolius* L. Syst. Nat. ed. 10. 2: 1269. 1759.

Pharus ovalifolius Desv.; Hamilt. Prodr. Pl. Ind. Occ. 8. 1825.

Similar to no. 1, the blades on the average broader, the spikelets longer, the summit of the fruit tapering.

Rich woods, West Indies to Brazil. Sometimes called "wild oats." Originally described from Jamaica; *P. ovalifolius* described from the Antilles.

Cuba (Province of Pinar del Río), Jamaica (Bath), Haiti, Santo Domingo, Guadeloupe, Martinique, St. Vincent, Grenada, and Trinidad.

57. LUZIOLA Gmel.

Pistillate and staminate spikelets in separate panicles; glumes wanting; caryopsis with a thick hard pericarp.

Blades 7 to 10 mm. wide; inflorescence many-flowered-----3. *L. spruceana*.

Blades 1 to 3 mm. wide; inflorescence few-flowered.

Fruit 2 mm. long-----2. *L. bahiensis*.

Fruit 1.5 mm. long-----1. *L. peruviana*.

1. *Luziola peruviana* Gmel. Syst. Nat. 637. 1791.

Similar to *L. bahiensis* but the inflorescence more delicate and the spikelets smaller, the fruit about 1.5 mm. long.

Wet ground, southern United States to Uruguay and Peru, whence originally described. Grisebach¹ records this species from Trinidad, but to us it is known from the West Indies only from Cuba (Lagoon Haiti, Mordazo, León 5941).

2. *Luziola bahiensis* (Steud.) Hitchc. Contr. U. S. Nat. Herb. 12: 234. 1909.

Caryochloa bahiensis Steud. Syn. Pl. Glum. 1: 5. 1854.

Luziola alabamensis Chapm. Fl. South. U. S. 584. 1860.

Luziola longivalvula Doell in Mart. Fl. Bras. 2²: 17. 1871.

A slender glabrous stoloniferous aquatic perennial with long linear blades (or aerial blades shorter and 4 to 5 mm. wide), narrow staminate panicles terminating the main culm, and open few-flowered pistillate panicles terminating the branches. Extremely variable in appearance according to the depth of water in which the specimen grew. Plants growing in places from which water has receded are low and widely creeping.

Rivulets, Alabama to Brazil. Originally described from Bahia.

Also in Cuba (Pinar del Río, Wright 3813).

3. *Luziola spruceana* Benth.; Doell in Mart. Fl. Bras. 2²: 18. 1871.

Culms thick, soft and spongy, freely branching; sheaths broad with long erect auricles; staminate panicles terminal; pistillate panicles terminal and axillary, corymbose, the numerous branches reflexed at maturity.

Ponds and lagoons, Cuba to Brazil, whence originally described. Called "pond-grass" in Trinidad.

Cuba (Ariguanabo Lagoon, León 4193), Trinidad (probably near Caroni River, Broadway 1626), and Tobago (The Whim, Broadway 3100).

58. ORYZA L.

Spikelets perfect, paniculate, laterally compressed; glumes minute; lemma and palea subindurate, papillose-roughened, the lemma awned (the awn sometimes obsolete).

1. *Oryza latifolia* Desv. Journ. de Bot. Desv. 1: 77. 1813.

Oryza sativa var. *latifolia* Doell in Mart. Fl. Bras. 2²: 7. 1871.

A rather robust perennial, the simple culms 2 meters or more tall, with thin flat scabrous blades commonly 50 to 60 cm. long and 4 to 5 cm. wide, and large many-flowered panicles, the short-awned spikelets short-pedicel along the upper half to two-thirds of the long slender ascending branches.

Swamps and ditches, Central America and West Indies to Brazil. Type locality given as Carolina and Porto Rico, the first clearly an error. The awn is described by Desvaux as being "brevissima." Later Hamilton² described the species from a specimen in Desvaux's herbarium without mentioning the awn. The habitat is here given as "in parte Hispanica Hispaniolae."

Haiti (Bayeux), Porto Rico (Mayaguez), and Trinidad (St. Joseph, Cedros).

ORYZA SATIVA L. Sp. Pl. 333. 1753. CULTIVATED RICE. ARROZ. This plant is cultivated throughout the West Indies and is occasionally found growing spontaneously in fields and ditches.

59. HOMALOCENCHRUS Mieg.

Spikelets awnless, the glumes wanting, otherwise as in *Oryza*, the plants and spikelets much smaller.

¹ Fl. Brit. W. Ind. 535. 1864.

² Prodr. Pl. Ind. Occ. 7. 1825.

Panicle contracted, the branches ascending, spikelet-bearing from near the base; spikelets hispid -----1. *H. hexandrus*.

Panicle open, the branches slender, spreading, naked below; spikelets smooth or sometimes sparsely hispid.

Spikelets 2 mm. long; blades about 5 mm. wide-----2. *H. monandrus*.

Spikelets 2.5 mm. long; blades 1 to 2 cm. wide-----3. *H. grandiflorus*.

1. *Homalocenchrus hexandrus* (Swartz) Kuntze, Rev. Gen. Pl. 2: 777. 1891.

Leersia hexandra Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Oryza hexandra Doell in Mart. Fl. Bras. 2²: 10. 1871.

A scabrous aquatic perennial, the slender culms often 2 meters tall, erect from a creeping base, the flat blades mostly 15 to 20 cm. long and about 8 mm. wide, the many-flowered panicle pale or purplish. Extensively creeping stolons with short blades are sometimes produced in land bordering ponds and ditches.

Swamps and ditches, southern United States to South America. Originally described from Jamaica.

Cuba, Jamaica, Santo Domingo, Porto Rico, Martinique, and Trinidad.

2. *Homalocenchrus monandrus* (Swartz) Kuntze, Rev. Gen. Pl. 2: 777. 1891.

Leersia monandra Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Paspalum cubense Spreng. Neu. Entd. 3: 12. 1822.

Leersia aspera Nees; Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 3¹: 168. 1849, as synonym of *Leersia monandra*.

Oryza monandra Doell in Mart. Fl. Bras. 2²: 9. 1871.

A densely tufted erect perennial with wiry culms and long linear scabrous, often grayish blades, the few very slender remote panicle branches spreading at maturity, bearing small pale suborbicular imbricate spikelets at the ends.

Rocky woods, southern Florida to Brazil. Originally described from Jamaica. *Paspalum cubense* was described from Cuba and neighboring islands. In Cuba called "hierba de venado" and "guinea cimarrona."

Cuba, Jamaica, Haiti, Santo Domingo, and Porto Rico (in the drier hills along the south coast).

3. *Homalocenchrus grandiflorus* (Doell) Hitchc. Contr. U. S. Nat. Herb. 17: 273. 1913.

Oryza monandra grandiflora Doell in Mart. Fl. Bras. 2²: 9. 1871.

Like the preceding in habit but much larger and stouter, the blades 1 to 2 cm. wide, the panicle branches commonly 15 cm. long.

Shady bank, Veracruz to South America; also in the Lesser Antilles. Originally described from Brazil.

Guadeloupe (*Duss* 3146) and Martinique (*Duss* 775).

60. REYNAUDIA Kunth.

Spikelets perfect; glumes strongly nerved, awned from between the lobes of the notched summit; lemma awn-tipped from the bilobed apex.

1. *Reynaudia filiformis* Kunth, Rév. Gram. 1: 195. 1829.

Polypogon filiformis Spreng.; Kunth, loc. cit. as synonym.

Polypogon cubensis A. Rich. in Sagra, Hist. Cuba 11: 313. 1850.

A tufted glabrous perennial with erect or ascending subfiliform culms 15 to 40 cm. tall, bearded nodes, short involute blades mostly clustered at the base, and small rather densely flowered panicles.

Savannas and moist places, western Cuba, Jamaica, and Hispaniola. Originally described from Santo Domingo. *Polypogon cubensis* was described from Cuba.

61. **STREPTOCHAETA** Schrad.

Spikelets subsessile on a slender flexuous axis, perfect, one of the sterile lemmas extending into a long smooth filiform tendril-like coiled awn, the tips of all the awns apparently attached to the prolonged summit of the axis; stigmas 3. An anomalous genus of doubtful relationship.

1. **Streptochaeta spicata** Schrad.; Nees, Agrost. Bras. 537. 1829.

An erect perennial, with broad thin elliptical blades and spikes of distant appressed elongate-conic spikelets with tendril-like awns.

In the shade of the forest, Brazil, whence originally described, to Trinidad (Caparo Forest, *Broadway* 4929).

62. **PHALARIS** L.

Spikelets strongly compressed, the keeled glumes exceeding the subindurate perfect floret and attached sterile lemmas.

1. **Phalaris canariensis** L. Sp. Pl. 54. 1753.

CANARY GRASS.

An erect annual with flat blades and ovoid heads, the papery imbricate spikelets whitish with green stripes.

Originally described from Europe, but widely distributed as a weed of waste places. Found in Bermuda and Cuba (Habana).

63. **ANTHOXANTHUM** L.

Glumes very unequal; sterile lemmas awned, exceeding the small awnless perfect floret.

1. **Anthoxanthum odoratum** L. Sp. Pl. 28. 1753.

SWEET VERNAL GRASS.

A tufted fragrant perennial with flat blades and loosely spikelike panicles commonly about 5 cm. long.

A native of Europe, occasionally cultivated in the United States and escaped from cultivation. Introduced in the vicinity of Cinchona, Jamaica. Originally described from Europe.

64. **ARISTIDA** L.

Spikelets in close or open panicles; glumes acuminate; lemma convolute, subindurate with a pointed callus and bearing from the apex a trifid awn.

Plants annual.....1. **A. adscensionis**.

Plants perennial.

Lateral awns minute or wanting.....9. **A. scabra**.

Lateral awns about as long as the middle one.

Panicle a dense bristly spike; fruit with a twisted neck 1 cm. long.

7. **A. spiciformis**.

Panicle open or contracted, not a dense spike; neck of fruit short or none.

Plants robust, more than 1 meter tall; blades as much as 50 cm. long and 4 mm. wide, very scabrous.....8. **A. erecta**.

Plants slender, usually less than 50 cm. tall; blades not over 2 mm. wide, smooth or slightly scabrous.

Awns or some of them 2 to 3 cm. long; blades sparsely pilose on the upper surface toward the base...6. **A. portoricensis**.

Awns mostly less than 1.5 cm. long.

Culms usually widely spreading; spikelets crowded on the short panicle branches.....2. **A. cognata**.

Culms erect or ascending; spikelets sometimes approximate but not crowded.

Culms rigid and wiry, bearing fascicled branches; leaves commonly in pairs, the blades usually short and rigid-----3. *A. curtifolia*.

Culms not rigid, simple or sparingly branching, the branches not fascicled.

Blades involute-setaceous, commonly clustered at the base-----4. *A. refracta*.

Blades flat, about 1 mm. wide, with a thick cartilaginous marginal band----5. *A. gyrans*.

1. *Aristida adscensionis* L. Sp. Pl. 82. 1753.

Aristida humilis H. B. K. Nov. Gen. & Sp. 1: 121. 1816.

Aristida bromoides H. B. K. Nov. Gen. & Sp. 1: 122. 1816.

Aristida maritima Steud. Syn. Pl. Glum. 1: 137. 1854.

A densely tufted glabrous annual, the slender wiry culms ascending or erect from a geniculate base, freely branching from the lower nodes, the narrow blades commonly involute, the nodding panicles about 10 to 15 cm. long, the slender branches short, appressed, or sometimes the lower 5 cm. or more long, spreading and flexuous, the spikelets short-pedicel, mostly clustered, the equal awns 12 to 20 cm. long. Extremely variable in appearance, ranging from dwarf plants with narrow compact panicles to larger plants, as much as 70 cm. tall, with flexuous panicles.

Open dry ground and waste places, throughout the warmer parts of America and the Old World. Originally described from the island of Ascension. *Aristida humilis* was described from Cumaná, Venezuela; *Aristida bromoides* from Ecuador, and *Aristida maritima* from Guadeloupe. This species has been commonly referred to *A. dispersa* Trin. & Rupr.¹ and is one of the forms the authors unite under this name. Grisebach² refers this species to *A. stricta* Michx.

Bahamas (Crooked Island, Long Cay, Long Island), Jamaica (in the vicinity of Kingston), Haiti, Santo Domingo, Porto Rico (along the southwestern coast and on Mona Island), St. Croix, St. Jan, Antigua, Montserrat, and Guadeloupe.

2. *Aristida cognata* Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5¹: 127. 1842.

Aristida swartziana Steud. Syn. Pl. Glum. 1: 137. 1854.

Culms tufted, slender, wiry, spreading, 15 to 30 cm. long, branching from the lower nodes; blades flat or involute, flexuous, densely scabrous and sparsely long-villous on the upper surface; panicles narrow, the short branches ascending, the spikelets clustered. Resembling short-awned specimens of *A. adscensionis* but usually taller and distinguishable by the perennial base.

Stony ground, southern Jamaica, Porto Rico (Boqueron), St. Thomas, whence originally described, and St. Croix. *Aristida swartziana* was described from Jamaica. Grisebach² refers this species to *A. purpurascens* Poir.

3. *Aristida curtifolia* Hitchc. Contr. U. S. Nat. Herb. 12: 235. 1909.

Culms densely tufted, wiry, rigid, 30 to 50 cm. tall, with fascicled branches; alternate internodes commonly shortened, bringing the leaves together in pairs, the blades involute, rigid, mostly short and spreading; panicles few-flowered, 3 to 10 cm. long, the awns about 12 mm. long.

¹ Mém. Acad. St. Pétersb. VI. Sci. Nat. 5¹: 129. 1842.

² Fl. Brit. W. Ind. 534. 1864.

Dry, rocky, or gravelly hills, throughout Cuba, whence originally described, *Wright* 736 from eastern Cuba being the type.

4. *Aristida refracta* Griseb. Cat. Pl. Cub. 228. 1866.

Culms densely tufted, wiry, ascending, 30 to 50 cm. tall, sparingly branching from the lower nodes; leaves mostly clustered at the base, the blades involute-setaceous, flexuous, commonly 10 cm. long (the one or two culm blades usually very short); panicles narrow, the short, rather distant branches ascending, the short-pediceled spikelets approximate; glumes about 5 mm. long, usually dark, the loosely twisted awns about 12 mm. long.

Dry savannas, Florida and the Greater Antilles. Originally described from Cuba, the type being *Wright* 3431 from Chirigote. In the type specimen the second glume is mucronate from a notched tip, and the leaves are not conspicuously clustered at the base. The specimens from Guanabacoa, Cuba, and from Jamaica and Porto Rico have entire glumes and leaves conspicuously clustered at the base. These may represent a distinct species.

Cuba (Province of Pinar del Río, Guanabacoa, Manajabo, and in the Province of Oriente), Jamaica (southern Manchester), and Porto Rico (Boqueron and Guanajibo).

5. *Aristida gyrans* Chapm. Bot. Gaz. 3: 10. 1878.

Culms cespitose, erect, wiry, glabrous, 30 to 70 cm. tall, simple or sparingly branching from the lower nodes; blades flat or the heavy margins incurved, 3 to 5 cm. long, about 1 mm. wide, a thickened ridge just inside the margin, the thickening particularly noticeable from the under side; panicles narrow, 5 to 15 cm. long, the branches short, appressed, few-flowered; spikelets short-pediceled, approximate; glumes 5 to 7 mm. long, the first slightly shorter than the second; lemma about as long as the glumes, the loosely twisted awns about equal, 10 to 12 mm. long, or the central as much as 15 mm. long.

Low, sandy soil, Florida, whence described, to Hispaniola.

Bahamas (New Providence), Cuba (Herradura, Isle of Pines), Haiti, and Santo Domingo.

6. *Aristida portoricensis* Pilger in Urban, Symb. Antill. 4: 100. 1903.

In large tufts, the slender wiry culms erect from a geniculate base, 30 to 50 cm. tall, finally branching; blades involute-setaceous, 5 to 8 cm. long; panicles rather loosely flowered, the branches ascending or spreading, a nearly sessile spikelet commonly in the axil, the short-pediceled approximate rust-colored spikelets about 12 mm. long excluding the awns, the summit of the lemma exceeding the glumes, the spreading awns 2 to 2.5 cm. long.

Open rocky slopes, Monte Mesa, western Porto Rico, whence described, the type specimen being *Sintenis* 77.

7. *Aristida spiciformis* Ell. Bot. S. C. & Ga. 1: 141. 1816.

Culms tufted, wiry, stiffly erect; blades involute; panicle 10 to 15 cm. long, densely flowered, very bristly and suggesting a spiral by reason of the long necks of the fruit all twisted in one direction.

Pine barrens, southeastern United States; also in Porto Rico (white sand barren, Campo Alegre, *Chase* 6614) and the Isle of Pines (*Britton, Britton & Wilson* 14198). Originally described from South Carolina or Georgia, presumably from the former.

8. *Aristida erecta* Hitchc. Contr. U. S. Nat. Herb. 12: 236. 1909.

Culms erect, rather stout, 1 to 2 meters tall, with long involute scabrous blades and long nodding panicles with ascending branches, the spikelets rather crowded, the awns about 2.5 cm. long.

Pine barrens, western Cuba, whence described, the type being *Wright* 3432.

9. *Aristida scabra* (H. B. K.) Kunth, Rév. Gram. 1: 62. 1829.*Streptachne scabra* H. B. K. Nov. Gen. & Sp. 1: 124. pl. 40. 1816.*Streptachne cubensis* A. Rich. in Sagra, Hist. Cuba 11: 311. 1850.

Culms densely tufted, compressed, wiry, 0.5 to 1 meter tall; leaves numerous, the blades mostly not over 2 mm. wide, involute; panicle usually about one-third the height of the plant, the few slender branches spreading at maturity, the short-pediceled appressed spikelets about 3 cm. long including the curved awn; lateral awns minute.

Open dry or stony ground, Florida, Bahamas (New Providence and Inagua), and western Cuba. Originally described from Mexico; *S. cubensis* described from Cuba. Two Bahama specimens, *Curtiss* 75 and *Nash & Taylor* 926, have more clustered spikelets with strongly curved awns as in *Streptachne floridana* Chapm.,¹ described from Key West, a form known only from the type collection, having ascending panicle branches, crowded spikelets, and conspicuously curved awns, probably not specifically distinct from *A. scabra*.

65. MUHLENBERGIA Schreb.

Spikelets paniculate; lemma bearing a long delicate awn.

1. *Muhlenbergia capillaris* (Lam.) Trin. Gram. Unifl. 191. 1824.*Stipa capillaris* Lam. Tabl. Encycl. 1: 158. 1791.

A densely tufted perennial with slender more or less twisted and flexuous simple culms 40 to 70 cm. tall, and numerous long fine involute blades, commonly overtopping the large purplish panicles, the numerous capillary fascicled branches bearing small delicately awned spikelets on long capillary pedicels.

Rocky soil, Massachusetts to Texas, eastern Mexico, and the northern islands of the West Indies. Originally described from Carolina.

Bahamas (Andros, New Providence), Cuba, and Porto Rico (junction of Rio Arecibo and Rio Limon).

66. PHLEUM L.

Spikelets strongly compressed; glumes abruptly mucronate, stiffly ciliate on the keel, exceeding the awnless floret.

1. *Phleum pratense* L. Sp. Pl. 59. 1753.

TIMOTHY.

A tufted perennial 0.5 to 1 meter tall with flat blades and a dense cylindrical head 5 to 10 cm. long, about 8 mm. thick.

Commonly cultivated as a meadow grass in temperate regions. Originally described from Europe. Established on the summit of Blue Mountain Peak, around the "cabin."

67. SPOROBOLUS R. Br.

Spikelets in spikelike or open panicles, awnless; glumes shorter than the floret; palea readily splitting; pericarp of the caryopsis loose, the seed readily falling therefrom.

Plants annual-----1. *S. muralis*.

Plants perennial.

Creeping rhizomes present.

Culms rarely over 40 cm. tall-----6. *S. virginicus*.Culms commonly 70 cm. or more tall-----7. *S. littoralis*.¹ Fl. South. U. S. 554. 1860.

Creeping rhizomes wanting.

Panicle large and diffuse, at least half the entire height of the plant.

2. *S. brasiliensis*.

Panicle narrow, contracted or if somewhat open not diffuse, less than one-third the entire height of the plant.

Glumes much shorter than the spikelet.

Panicle branches slender, rather loosely arranged; blades slender and lax; glumes about 0.3 mm. long, nearly equal.

8. *S. indicus*.

Panicle branches short, contiguous, forming a narrow, rather compact spike; blades firm, as much as 5 mm. wide; glumes 0.5 to 1 mm. long, unequal.

9. *S. berterianus*.

Glumes unequal, the second as long as the spikelet.

Spikelets about 1.5 mm. long; panicle pyramidal.

Lowermost panicle branches several in a whorl; sheaths hairy in the throat.

3. *S. argutus*.

Lowermost panicle branches in 1's or 2's; sheaths glabrous in the throat.

4. *S. atrovirens*.

Spikelets 2 to 4 mm. long; panicle elongate-oblong.

Panicle green or whitish; spikelets about 2 mm. long.

5. *S. domingensis*.

Panicle purple; spikelets 2.5 to 4 mm. long.

Basal sheaths copiously felty-ciliate; spikelets 3.5 to 4 mm. long.

11. *S. cubensis*.

Basal sheaths not felty; spikelets 2.5 mm. long.

10. *S. purpurascens*.

1. *Sporobolus muralis* (Raddi).

Agrosticula muralis Raddi, Agrost. Bras. 33. pl. 1. f. 2. 1823.

A slender pale glabrous ascending annual, 30 to 70 cm. tall, with compressed culms, flat blades 2 to 3 mm. wide, and narrow, loosely flowered panicles about half the entire length of the plant, the delicate branches ascending, the minute spikelets long-pediceled.

Waste ground, Lesser Antilles to Brazil. Originally described from Rio de Janeiro.

St. Croix, Tortola, Martinique, and St. Lucia.

2. *Sporobolus brasiliensis* (Raddi) Hack. Bull. Herb. Boiss. II. 4⁸: 278. 1904.

Aira brasiliensis Raddi, Agrost. Bras. 36. 1823.

Eragrostis airoides Nees, Agrost. Bras. 509. 1829.

Culms erect, commonly 1 meter tall, the long blades more or less involute, scabrous on the upper surface; panicles rather more than half the entire length of the plant, the numerous branches and branchlets subcapillary, flexuous, ascending or spreading, the minute spikelets often 2-flowered.

Savannas, Brazil; also in Cuba (Chirigote, Sumidero). Originally described from Rio de Janeiro. *Eragrostis airoides*, based on a 2-flowered form, was also described from Brazil.

3. *Sporobolus argutus* (Nees) Kunth, Enum. Pl. 1: 215. 1833.

?*Agrostis pyramidata* Lam. Tabl. Encycl. 1: 161. 1791, not *Sporobolus pyramidalis* Beauv. 1807.

?*Sporobolus affinis* Kunth, Rév. Gram. 1: 68. 1829.

Vilfa arguta Nees, Agrost. Bras. 395. 1829.

Vilfa richardi Steud. Syn. Pl. Glum. 1: 153. 1854.

Agrostis pyramidalis A. Rich.; Steud. Syn. Pl. Glum. 1: 153. 1854, as synonym.

? *Vilfa affinis* Steud. Syn. Pl. Glum. 1: 161. 1854.

A low tufted glabrous perennial with spreading culms, rather thick subinvolute short blades, and pale many-flowered panicles, at first contracted, at maturity narrowly pyramidal or oblong.

Open sandy or alkaline soil, southwestern United States to South America. Originally described from Brazil.

Bahamas (Fortune Island), Cuba, Jamaica, Haiti, Santo Domingo, Porto Rico, St. Croix, Antigua, and Trinidad.

4. *Sporobolus atrovirens* (H. B. K.) Kunth, Rév. Gram. 1: 68. 1829.

Vilfa atrovirens H. B. K. Nov. Gen. & Sp. 1: 138. 1816.

Sporobolus bahamensis Hack. Oesterr. Bot. Zeitschr. 52: 56. 1902.

Similar to the preceding, erect or ascending, the leaves more aggregated at the base, the panicle branches longer.

Open rocky soil, Mexico; also in the Bahamas. Originally described from the Valley of Mexico. *Sporobolus bahamensis* was described from Acklin Island, Eggers 3905 being the type. The author distinguishes the species by its monandrous florets, but we find only one stamen in any of the specimens examined of *S. atrovirens* from Mexico, including those of the type collection made by Humboldt. In the West Indies found only on Acklin Island.

5. *Sporobolus domingensis* (Trin.) Kunth, Enum. Pl. 1: 214. 1833.

Vilfa domingensis Trin. in Spreng. Neu. Entd. 2: 59. 1821.

Agrostis domingensis Schult. Mant. 3: 570. 1827.

We have not been able to verify the last reference.

Resembling no. 3 but larger, the culms commonly 40 cm. tall, the panicles contracted, densely flowered.

Sandy or alkaline soil, Bahamas and Greater Antilles. Originally described from Santo Domingo.

Bahamas (Anguilla Isles, New Providence, Fortune Island), eastern Cuba, and Porto Rico (Cabo Rojo, Sintenis 549b, an immature specimen doubtfully referred).

6. *Sporobolus virginicus* (L.) Kunth, Rév. Gram. 1: 67. 1829.

Agrostis virginica L. Sp. Pl. 63. 1753.

Vilfa virginica Beauv. Ess. Agrost. 16, 182. 1812.

Culms 15 to 40 cm. tall, erect from extensively creeping hard scaly rhizomes, the numerous leaves conspicuously distichous, the sheaths overlapping, the blades firm, involute-pointed; panicles spikelike, commonly not over 5 cm. long. Extensive colonies of sterile plants often found along sandy beaches.

Saline soil along the coast, Virginia to Brazil. Originally described from Virginia. Common throughout the West Indies.

7. *Sporobolus littoralis* (Lam.) Kunth, Rév. Gram. 1: 68. 1829.

Agrostis littoralis Lam. Tabl. Encycl. 1: 161. 1791.

Similar to the preceding but larger throughout, the culms commonly 70 cm., sometimes 1 meter, tall, the panicles as much as 15 cm. long. Possibly not specifically distinct from *S. virginicus*.

Saline marshes and sea beaches, West Indies to Brazil. Originally described from tropical America.

Bermuda, Cuba, Porto Rico, Guadeloupe, Grenada, Barbados, Trinidad, and Tobago.

8. *Sporobolus indicus* (L.) R. Br. Prodr. Fl. Nov. Holl. 1: 170. 1810.

Agrostis indica L. Sp. Pl. 63. 1753.

Sporobolus lamarckii Hamilt. Prodr. Pl. Ind. Occ. 4. 1825.

Sporobolus jacquemontii Kunth, Rév. Gram. 2: 427. pl. 127. 1831.

Vilfa jacquemontii Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4¹: 92. 1840.

Vilfa indica Trin.; Steud. Nom. Bot. ed. 2. 2: 767. 1841.

Culms erect, 0.6 to 1 meter tall, in large clumps with numerous leafy shoots at the base; panicle 15 to 30 cm. long, the slender branches ascending, the short-pedicelled spikelets mostly borne along the lower side. Often forming an almost pure stand on open slopes, an important constituent of native pastures.

Grassy hills and dry savannas, Bahamas and Mexico to northern South America. Originally described from Jamaica. *Sporobolus lamarckii* was described from "India Occidentali" and *S. jacquemontii* from Santo Domingo. Found throughout the West Indies. In Cuba called "espartillo" and "espartillo fino."

9. *Sporobolus berterioanus* (Trin.).

?*Agrostis tenuissima* Spreng. Syst. Veg. 1: 258. 1825, not *Sporobolus tenuissimus* (Schrank) Kuntze, 1898.

Vilfa berterioana Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4¹: 100. 1840.

Sporobolus angustus Buckl. Proc. Acad. Phila. 1862: 88. 1862.

Resembling the preceding, the panicle narrower, the shorter densely flowered branches erect. The abundant reddish ripe grains extruded from the glumes often remain attached to the panicle by their mucilaginous coats.

Open, mostly moist ground and waste places, southern United States to South America, apparently introduced in the West Indies. Originally described from Santo Domingo; *Agrostis tenuissima* described from the West Indies, and *S. angustus* from Texas. This species has been included with the preceding under *Sporobolus indicus*, and by some botanists¹ has been described as *Sporobolus indicus*, while the preceding species has been distinguished as *Sporobolus jacquemontii*. Often affected by a black fungus.

Bermuda, Bahamas (New Providence), Cuba, Jamaica, Porto Rico, St. Croix, St. Jan, Tortola, Antigua, Montserrat, Guadeloupe, Martinique, Grenada, Trinidad, and Tobago.

10. *Sporobolus purpurascens* (Swartz) Hamilt. Prodr. Pl. Ind. Occ. 5. 1825.

Agrostis purpurascens Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Vilfa purpurascens Beauv. Ess. Agrost. 16, 182. 1812.

Vilfa grisebachiana Fourn. Mex. Pl. 2: 98. 1886.

Culms slender, erect, tufted, with numerous short leaves at base, naked above, the blades flat, rather thin; panicle 10 to 15 cm. long, the short branches in usually rather distant whorls, spikelet-bearing to the base.

Grassy slopes, southern United States, eastern Mexico, Cuba (Province of Pinar del Río), and Jamaica (Blue Mountains). Originally described from Jamaica. The type of *Vilfa grisebachiana* is Wright 3427 from Cuba.

11. *Sporobolus cubensis* Hitchc. Contr. U. S. Nat. Herb. 12: 237. 1909.

Differs from the preceding in having long firm involute blades and pyramidal panicles, the branches commonly 2 to 3 cm. long, naked at base.

Sandy barrens, Cuba (Province of Pinar del Río and Isle of Pines) and Porto Rico (Mayaguez, Heller 4590); also in Venezuela. Originally described from Isle of Pines, the type being Curtiss 392.

68. POLYPOGON Desf.

Spikelets short-pedicellate; glumes awned, exceeding the short-awned lemma.

Plants annual; panicle dense and silky-----1. *P. monspeliensis*.
Plants perennial; panicle lobed or interrupted, not silky-----2. *P. littoralis*.

¹ Griseb. Fl. Brit. W. Ind. 533. 1864.

1. *Polypogon monspeliensis* (L.) Desf. Fl. Atlant. 1: 67. 1798.

Alopecurus monspeliensis L. Sp. Pl. 61. 1753.

A low, weedy annual with inflated sheaths and dense silky-awned oblong heads.

Waste places, introduced from Alaska to Mexico and occasionally in other parts of America; also in Bermuda. A native of the Old World. Originally described from Montpellier, France.

2. *Polypogon littoralis* (With.) J. E. Smith, Comp. Fl. Brit. 13. 1800.

Agrostis littoralis With. Bot. Arr. Veg. Brit. ed. 3. 2: 129. 1796.

A spreading perennial rooting at the nodes, the panicles less dense and less silky than those of the preceding species. Moist places, introduced from Europe into the warmer parts of America. Found in Bermuda. Originally described from Great Britain.

69. AGROSTIS L.

Spikelets paniculate; glumes awnless, exceeding the lemma; palea in most species wanting.

Palea about half as long as the lemma-----1. *A. alba*.

Palea wanting-----2. *A. perennans*.

1. *Agrostis alba* L. Sp. Pl. 63. 1753.

REDTOP.

Perennial from creeping rootstocks; culms erect; blades flat, scabrous; panicles open.

Commonly cultivated in the United States as a meadow and pasture grass. Introduced in Jamaica on Blue Mountain Peak. Originally described from Europe.

2. *Agrostis perennans* (Walt.) Tuckerm. Amer. Journ. Sci. 45: 44. 1843.

Cornucopiae perennans Walt. Fl. Carol. 74. 1788.

Culms tufted, weak, ascending, the leaves mostly clustered toward the base, the panicles loose and open, the spikelets borne at the ends of the branchlets.

Open woods, northeastern United States to northern South America; also in the mountains of Santo Domingo (Constanza, Loma Rosilla). Originally described from South Carolina.

70. NOTHOLCUS Nash.

Spikelets 2-flowered; glumes equal, exceeding the florets; lower floret perfect, awnless, the upper staminate, bearing a hooklike dorsal awn.

1. *Notholcus lanatus* (L.) Nash; Hitchc. in Jepson, Fl. Calif. 1: 126. 1912.

VELVET GRASS.

Holcus lanatus L. Sp. Pl. 1048. 1753.

Perennial, 0.5 to 1 meter tall, grayish-velvety throughout, the pale, rather densely flowered narrow panicle usually 8 to 10 cm. long.

Introduced in America and occasionally cultivated as a meadow grass. Originally described from Europe. Collected in Jamaica (Hart 748), no locality given.

71. TRISETUM Pers.

Spikelets with 2 or 3 perfect florets; glumes unequal; lemmas bidentate, bearing a slender dorsal awn.

1. *Trisetum spicatum* (L.) Richt. Pl. Eur. 1: 59. 1890.

Aira spicata L. Sp. Pl. 64. 1753.

Trisetum toluccense Kunth, Rév. Gram. 1: 101, 297. pl. 60. 1829.

A densely tufted perennial with linear flat erect blades and shining spikelike panicles about 5 to 7 cm. long.

Arctic regions of the northern hemisphere, extending southward in the mountains to the southern hemisphere. Originally described from Lapland. In the West Indies only at high altitudes in Santo Domingo (Constanza, *Türckheim* 3133).

72. SPHENOPHOLIS Scribn.

Spikelets 2-flowered; glumes unequal, falling with the spikelet, the first narrow, acute, the second cuneate, blunt, becoming subcoriaceous in fruit; lemmas awnless.

1. *Sphenopholis obtusata* (Michx.) Scribn. *Rhodora* 8: 142. 1906.

Aira obtusata Michx. Fl. Bor. Amer. 1: 62. 1803.

Eatonia obtusata A. Gray, Man. ed. 2. 558. 1856.

A slender erect perennial with simple culms, linear blades, and shining spikelike panicles 5 to 8 cm. long.

Meadows and open woods, northeastern United States to southern Mexico; also in the mountains of Santo Domingo (Constanza, Valle Nuevo). Originally described from southeastern United States.

73. KOELERIA Pers.

Spikelets 2 to 4-flowered, glumes unequal, slightly shorter than the florets; lemmas awned.

1. *Koeleria phleoides* (Vill.) Pers. Syn. Pl. 1: 97. 1805.

Festuca phleoides Vill. Fl. Delph. 7. 1785.

A slender erect sparsely pilose annual 10 to 25 cm. tall, with lax flat blades and dense spikes of delicately awned spikelets.

A native of Europe; introduced in Bermuda.

74. AVENA L.

Spikelets large, 2 to 4-flowered; glumes equal, many-nerved, papery, exceeding the florets; lemmas bidentate, bearing a dorsal awn, the awn sometimes rudimentary.

Lemmas pubescent with long brown hairs.....1. *A. fatua*.

Lemmas glabrous or nearly so.....2. *A. sativa*.

1. *Avena fatua* L. Sp. Pl. 80. 1753.

WILD OAT.

A rather stout annual with long flat blades and large open panicles of large nodding spikelets.

A native of Europe, introduced in America, especially on the Pacific coast of the United States. Collected in Jamaica (*Hart* 1493), no locality given.

2. *Avena sativa* L. Sp. Pl. 79. 1753.

CULTIVATED OAT.

Differs from the preceding in its glabrous florets, and in the awns wanting or reduced and readily disarticulating.

Commonly cultivated in temperate regions and escaped or spontaneous in fields and waste places. Occasionally spontaneous in the cooler parts of the Tropics. Found in Cuba (near Habana, *León* 809) and Jamaica (near summit of Blue Mountain Peak, *Hitchcock* 9369).

75. DANTHONIA DC.

Spikelets several-flowered; glumes subequal, exceeding all the florets; lemmas bifid, with a twisted awn between the teeth; awn flat, formed by the extension of the 3 middle nerves of the lemma.

Awns of lemma lobes about 6 mm. long-----1. *D. shrevei*.
 Awns of lemma lobes about 2 mm. long-----2. *D. domingensis*.

1. *Danthonia shrevei* Britton; Nash, *Torreyana* 9: 210. 1909.

A densely tufted perennial with elongate involute scabrous blades aggregated at the base and overtopping the rather open panicle, the spikelets 12 to 15 mm. long, the spreading awns about 1 cm. long.

On cleared slopes near summit of Sir Johns Peak, Jamaica, whence described and the only known locality, the type collected by Shreve, May 7, 1906. Grows in large dense tufts that finally form tussocks raised above the general level of the soil.

2. *Danthonia domingensis* Hack. & Pilger in Urban, *Symb. Antill.* 6: 1. 1909.

Resembling the preceding, the blades more slender, scabrous only toward the apex, the panicle looser, the spikelets slightly larger.

Mountain meadows, Santo Domingo, whence described (Loma Rosilla, Province de la Vega, *Fuertes* 1776; Constanza, *Türkheim* 3414). The type specimen is *Eggers* 2227b.

76. CAPRIOLA Adans.

Spikelets 1-flowered, sessile, imbricate, in slender unilateral spikes; glumes unequal, narrow, acute; lemma broad, boat-shaped, inclosing a palea of equal length.

1. *Capriola dactylon* (L.) Kuntze, *Rev. Gen. Pl.* 2: 764. 1891. BERMUDA GRASS.
Panicum dactylon L. *Sp. Pl.* 58. 1753.

Cynodon dactylon Pers. *Syn. Pl.* 1: 85. 1805.

A low, extensively creeping perennial with compressed wiry culms, narrow, usually short blades, and 3 to 5 slender arcuate-spreading spikes aggregated at the apex of the culms.

Common in open, rather dry ground in the warmer parts of both hemispheres; apparently introduced in America. Originally described from southern Europe. To be found on probably all the islands of the West Indies. A common and well-known pasture grass, called Bermuda grass in the United States and Bahama grass in the English West Indies. In the Spanish islands it is called "grama," "hierba fina," and "hierba del prado," and because of its digitate spikes, "pata de gallina." In Antigua it is called "devil's grass."

77. SPARTINA Schreb.

Spikelets 1-flowered, sessile, flattened laterally, densely pectinate in thick unilateral spikes; glumes unequal, acuminate; lemma and palea obtuse, subequal.

1. *Spartina patens juncea* (Michx.) Hitchc. *Rhodora* 8: 210. 1906.

Trachynotia juncea Michx. *Fl. Bor. Amer.* 1: 64. 1803.

Spartina juncea Willd. *Enum. Pl.* 81. 1809.

Perennial with long stout scaly rhizomes and slender but strong erect culms commonly 1 meter or more tall, the long blades firm, involute, the inflorescence of 3 to 6 suberect spikes about 5 cm. long. Large colonies of sterile plants often found on sandy beaches.

Salt marshes and beaches along the coast, eastern United States and the West Indies. Originally described from South Carolina.

Bermuda, Bahamas (Eleuthera, Fortune Island), Jamaica (Black River), Porto Rico, Guadeloupe, and Martinique.

SPARTINA CYNOSUROIDES (L.) Roth. In the National Herbarium there is a specimen of this species, consisting only of an inflorescence, labeled "Bahama Islands."

78. *CHLORIS* Swartz.

Spikelets with 1 perfect floret, sessile along a slender rachis forming unilateral spikes, these digitate; glumes unequal; lemma awned or mucronate; rachilla prolonged behind the palea and bearing 1 to few rudimentary awned sterile lemmas. In Cuba the species are called "pata de gallina" because of their digitate spikes. Those with villous florets are often included in the general name "barba de indio" (Indian beard).

Lemmas awnless; spikes dark brown. (*EUSTACHYS*.)-----1. *C. petraea*.

Lemmas awned; spikes pale or purplish.

Sterile floret narrow, the apex acute or subacute; spikelets imbricate, not pectinately arranged.

Spikes numerous, at least 10, ascending; spikelets approximate.

5. *C. radiata*.

Spikes not more than 6; spikelets somewhat distant.

Culms leafy throughout; spikes erect-----4. *C. leptantha*.

Culms naked or with few remote leaves; spikes divergent.

Spikelets divergent; plant delicate; blades filiform.

2. *C. cruciata*.

Spikelets appressed; plant slender but wiry; blades 1 to 2 mm. wide -----3. *C. sagraeana*.

Sterile floret broad, truncate, broadest at the summit; spikelets pectinately arranged.

Plants perennial; commonly more than 1 meter tall.

10. *C. polydactyla*.

Plants annual; usually less than 75 cm. tall.

Awn of fertile lemma not longer than the body; lemma long-ciliate on keel and margins-----9. *C. ciliata*.

Awn of fertile lemma at least twice as long as the body.

Sterile florets 2; sterile lemmas nearly as broad as long.

8. *C. paraguayensis*.

Sterile floret 1; sterile lemma narrow, more than twice as long as broad.

Margins of fertile lemma ciliate from near the base, the hairs 0.5 mm. long; sheaths hairy in the throat.

6. *C. orthonoton*.

Margins of fertile lemma bearing near the apex a prominent tuft of hairs about 2 mm. long; keel of lemma ciliate to near the summit; sheaths glabrous in the throat -----7. *C. virgata*.

1. *Chloris petraea* Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Agrostis complanata Ait. Hort. Kew. 1: 96. 1789.

Eustachys petraea Desv. Nouv. Bull. Soc. Philom. Paris 2: 189. 1810.

Schultesia petraea Spreng. Pl. Pugill. 2: 17. 1815.

Chloris septentrionalis C. Muell. Bot. Zeit. 19: 340. 1861.

Chloris swartzii C. Muell. Bot. Zeit. 19: 341. 1861.

Chloris swartziana Doell in Mart. Fl. Bras. 2³: 68. 1878.

A glabrous glaucous sparingly stoloniferous perennial, the flat culms ascending, the keeled sheaths often in pairs, especially in robust plants, the flat,

thickish blades oblong or linear, obtuse; spikes few to several, the rachis and glumes pale green, the florets chestnut.

Open ground, especially in limestone soil near the coast, southern United States to Panama and the West Indies. Originally described from Jamaica; *Agrostis complanata* described from garden plants grown from seed from Jamaica; *C. septentrionalis* described from Texas.

Bermuda, Bahamas (Hog Island, New Providence, Anguilla Isles, Andros), Cuba, Jamaica, Santo Domingo, Porto Rico, and Trinidad.

CHLORIS CARIBAEA Spreng. (Syst. Veg. 1: 295. 1825. *C. bahiensis* Steud.) was described from "Ins Carib." The type specimen is labeled as collected in Guadeloupe by Bertero, but the locality is probably an error.¹

2. *Chloris cruciata* (L.) Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Agrostis cruciata L. Syst. Nat. ed. 10. 2: 893. 1759.

Vilfa? cruciata Beauv. Ess. Agrost. 16, 181. 1812.

Rabdochloa cruciata Beauv. Ess. Agrost. 84, 158, 176. 1812.

Chloris humboldtiana Steud. Syn. Pl. Glum. 1: 205. 1854.

Chloris brevigluma Wright, Anal. Acad. Cienc. Habana 8: 200. 1871.

A low, densely tufted perennial, with delicate, sometimes elongate and straggling culms, branching from the lower nodes, filiform blades, and usually 2 or 3 at length widely spreading spikes 2 to 3 cm. long, the small spikelets with long delicate awns.

Stony slopes, Cuba and Jamaica. Originally described from Jamaica. *Chloris humboldtiana* and *C. brevigluma* were described from Cuba, Wright 1548 in part being the type of the latter.

3. *Chloris sagraeana* A. Rich. in Sagra, Hist. Cuba 11: 315. 1850.

Chloris eleusinoides Griseb. Fl. Brit. W. Ind. 539. 1864.

Chloris eleusinoides var. *vestita* Greenm. in Combs, Trans. Acad. St. Louis 7: 477. 1897.

Perennial; culms ascending, 20 to 60 cm. long, branching from the lower nodes; sheaths keeled, blades folded; spikes mostly 4 or 5, stiffly horizontally spreading at maturity, the imbricate but not crowded spikelets with delicate awns about 12 mm. long. Foliage occasionally puberulent.

Open ground and grassy banks, West Indies. Originally described from Cuba. Richard states that his plant agrees perfectly with Sloane's plate 68, fig. 3, which is the same as *C. eleusinoides*.² *Chloris eleusinoides* was described from Jamaica and Antigua. The variety *vestita* is based on a puberulent specimen from Cienfuegas, Cuba.

Bahamas (New Providence, Inagua), Cuba, Jamaica, Santo Domingo, St. Croix, Antigua, and Guadeloupe.

4. *Chloris leptantha* Hitchc. in Urban, Symb. Antill. 7: 166. 1912.

A tufted ascending leafy perennial, commonly 30 to 50 cm. tall, the sheaths and numerous short usually flat blades pubescent; spikes slender, the spikelets rather distant.

Open dry ground Jamaica (vicinity of Kingston and eastward), Santo Domingo (Las Salinas) and northern South America. Originally described from the island of Bonaire.

5. *Chloris radiata* (L.) Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Agrostis radiata L. Syst. Nat. ed. 10. 2: 879. 1759.

¹ Compare Urban, Symb. Antill. 4: 103. 1903.

² For a discussion of Sloane's plate and the type of *Agrostis radiata* L. see Contr. U. S. Nat. Herb. 12: 120. 1908.

Chloris glaucescens Steud. Syn. Pl. Glum. 1: 206. 1854.

A weedy branching decumbent-ascending annual, the sheaths broad, compressed, the blades thin, flat or folded, scaberulous or sparsely pilose, the slender spikes somewhat flexuous.

Ditches and waste places, southern Mexico and the West Indies to northern South America. Originally described from Jamaica. Found throughout the West Indies as a common weed along roadsides.

6. *Chloris orthonoton* Doell in Mart. Fl. Bras. 2^a: 64. 1878.

Sparingly stoloniferous, grayish, the flat culms commonly 40 to 60 cm. tall, the compressed sheaths hairy in the throat, the flat or folded blades about 5 mm. wide, scabrous on the upper surface; spikes 4 to 9, ascending, somewhat flexuous, the awns about 1 cm. long.

Open ground and waste places, Mexico to Costa Rica; also in Cuba (Habana) and Jamaica (Vere). Originally described from specimens growing in the Botanical Garden at Montpellier, France. This species was formerly referred by Hitchcock¹ to *Chloris virgata*. *Chloris glaucescens* was described from Guadeloupe. In Cuba called "hierba de pavo."

7. *Chloris virgata* Swartz, Fl. Ind. Occ. 1: 203. 1797.

Chloris elegans H. B. K. Nov. Gen. & Sp. 1: 166. pl. 47. 1816.

Chloris penicillata Willd.; Steud. Nom. Bot. ed. 2. 1: 353. 1840, as synonym.

Culms ascending, 20 to 40 cm. tall, scarcely compressed, the upper sheaths slightly inflated, glabrous in the throat; spikes mostly 5 or 6, suberect, somewhat flexuous in age, 3 to 5 cm. long; fertile lemma villous on the keel to a little below the summit.

Open mostly sterile ground, West Indies to Brazil. Originally described from Antigua. There has been some confusion as to the identity of this species. There is no specimen of it in the Swartz Herbarium,² but Swartz's description applies well to the form to which the name is here assigned, and not to the form (*C. orthonoton* Doell) to which Kunth³ assigned it. Doell⁴ interprets Swartz's species as it is here understood. *Chloris elegans*, originally described from Mexico, is figured with lemma glabrous on the keel, but continental specimens show all gradations between glabrous and strongly villous keels.

Cuba, Jamaica (Linstead), and Guadeloupe.

8. *Chloris paraguayensis* Steud. Syn. Pl. Glum. 1: 204. 1854.

Tufted, 30 to 75 cm. tall; culms and sheaths strongly compressed; blades long, lax; spikes about 10, usually flexuous, commonly purplish-tinged, 4 to 6 cm. long, the slender spreading awns about 6 mm. long.

Open ground and waste places, Mexico and the West Indies to South America. Originally described from Paraguay. Grisebach refers this species to *Chloris barbata* Swartz. Common in the West Indies from the Bahamas and Cuba to Martinique.

9. *Chloris ciliata* Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Chloris propinqua Steud. Syn. Pl. Glum. 1: 204. 1854.

Culms rather stouter and blades firmer than in the preceding; spikes pale, 4 to 6, strongly flexuous, the florets conspicuously silky-ciliate, the awns 1 to 1.5 mm. long.

¹ Contr. U. S. Nat. Herb. 17: 332. 1913.

² See Contr. U. S. Nat. Herb. 12: 142. 1908.

³ H. B. K. Nov. Gen. & Sp. 1: 166. 1816.

⁴ In Mart. Fl. Bras. 2^a: 65. 1877.

Open ground and waste places, Texas and the West Indies to South America. Originally described from Jamaica. *Chloris propinqua* was described from Guadeloupe.

Bahamas (New Providence), Cuba, Jamaica, Santo Domingo, Porto Rico (Ponce), St. Croix, Antigua, Guadeloupe, Martinique, and Grenada.

10. *Chloris polydactyla* (L.) Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Andropogon barbatus L. Syst. Nat. ed. 10. 2: 1305. 1759.

Andropogon polydactylon L. Sp. Pl. ed. 2. 1483. 1763.

Chloris barbata Nash, Bull. Torrey Club 25: 443. 1898, not *Chloris barbata* Swartz, 1797 (this being *Andropogon barbatus* L., 1771, from the East Indies).

Culms rather stout, commonly more than 1 meter tall; blades about 1 cm. wide; spikes 5 to 10, pale, usually 8 to 10 cm. long, strongly flexuous. The tallest species of the genus in the West Indies.

Savannas and grassy slopes, Florida and the West Indies to Brazil. Originally described from Jamaica.

Bahamas (New Providence, Cat Island), Jamaica, and Antigua.

79. GYMNOPOGON Beauv.

Spikelets with 1 perfect floret and 2 or 3 sterile florets, mostly reduced to single awns, above it; glumes equaling or exceeding the florets; fertile lemma narrow, long-awned; spikelets distant or approximate, appressed along a slender axis.

Spikes 2 to 4 cm. long, aggregated at the summit of the naked culms.

1. *G. foliosus*.

Spikes 15 to 25 cm. long, scattered along the upper part of the culms.

2. *G. spicatus*.

1. *Gymnopogon foliosus* (Willd.) Nees, Agrost. Bras. 426. 1829.

Chloris foliosa Willd. Sp. Pl. 4: 924. 1806.

Biathertum foliosum Desv. Opusc. 72. 1831.

Aristida geminata Willd.; Steud. Nom. Bot. ed. 2. 1: 131. 1840, as synonym.

Chloris aristata Salzm.; Steud. Syn. Pl. Glum. 1: 218. 1854, as synonym.

A tufted annual, the wiry branching, short-jointed culms ascending (sometimes decumbent at base), 15 to 50 cm. tall, with numerous short, squarrose blades and a subdigitate inflorescence of few to several ascending, delicately awned spikes.

White sand barrens near Laguna del Tortuguero, Porto Rico, Santo Domingo (locality unknown), St. Thomas, and northern South America. Originally described from St. Thomas.

2. *Gymnopogon spicatus* (Spreng.) Kuntze, Rev. Gen. Pl. 3²: 354. 1898.

Polypogon spicatus Spreng. Syst. Veg. 1: 243. 1825.

Gymnopogon laevis Nees, Agrost. Bras. 428. 1829.

Gymnopogon filiformis Griseb. Fl. Brit. W. Ind. 538. 1864.

A straggling perennial with slender wiry culms 0.5 to 1 meter long, thickish blades 3 to 7 cm. long, the inflorescence commonly nearly half the entire length of the plant, the slender divaricate spikes naked or nearly so for the lower one-third to half their length.

Sterile hills, Trinidad (locality unknown, *Trin. Bot. Gard. Herb.* 3361) to Argentina. Originally described from Brazil. The type locality of *G. laevis* is Brazil, of *G. filiformis*, Trinidad.

80. SAUGETIA gen. nov.

Spikelets 2-flowered, the first perfect, the second neuter and much reduced; glumes thin, unequal, 1-nerved, acuminate, shorter than the floret; first floret stipitate, the lemma firm, minutely 2-toothed at the apex, 3-nerved, the mid-nerve produced into a delicate awn; palea slightly shorter than the lemma, acute, sulcate between the nerves; second floret reduced to a minute glume on an elongate slender rachilla joint. Cespitose perennial with slender wiry branching culms, filiform blades, and solitary delicate few-flowered spikes, the spikelets subsessile, contiguous but scarcely imbricate along one side of a slender continuous rachis, closely appressed to it.

Type and only known species, *Saugetia fasciculata*.

Saugetia we judge to be most nearly related to *Gymnopogon* and the South American *Monochaete*, from both of which it differs in having a solitary terminal spike. It differs further from *Gymnopogon* in having but a single rudimentary floret and from *Monochaete* in the stipitate fertile floret and in the presence of a sterile floret.

It gives us great pleasure to name this striking genus for Brother León, Joseph Sylvestre Sauget, who has contributed greatly to our knowledge of the grasses of Cuba.

1. *Saugetia fasciculata* sp. nov.

Plants perennial in dense hard tufts, glabrous throughout; culms slender, hard and wiry, 40 to 50 cm. tall, erect or the summit leaning, the internodes elongate, branching at most of the nodes, the branches mostly fascicled, commonly one of them elongate, the others reduced to leafy shoots of overlapping sheaths and short spreading blades, these branchlets forming conspicuous tufts along the main culms and branches; sheaths 5 to 8 mm. long, with broad papery margins, a tuft of delicate white hairs 1 mm. long at the summit, these wanting on old sheaths, the sheaths of the branchlets reduced; ligule obsolete; blades filiform, crescent-shaped in cross section, scarcely 0.5 mm. wide when flattened out, flexuous, the primary blades as much as 10 cm. long, those of the branchlets 1 to 3 cm. long; spikes long-exserted, erect, 3 to 5 cm. long, the rachis subfiliform, slightly concavo-convex, the spikelets fitting into the concavities; spikelets distant by about their own length to half their length, 3.6 to 3.8 mm. long excluding the awn; glumes lanceolate-subulate, the first 0.7 to 0.8 mm. long, the second 2 to 2.5 mm. long; floret stipitate, the stipe 0.5 mm. long, bearded with erect hairs 0.4 to 0.5 mm. long; lemma 3.2 mm. long (excluding the awn), about 0.4 mm. wide, glabrous, the lateral nerves near the margin, the midnerve becoming strong toward the summit and produced into a delicate flexuous erect, minutely scabrous awn 12 to 16 mm. long; palea minutely scabrous on the nerves; second floret reduced to a narrow pointed 1-nerved lemma about 1.2 mm. long, the slender glabrous erect rachilla joint 1.8 mm. long.

Type in the U. S. National Herbarium, no. 950204, collected in a small wood, Savana San Julián, south of Guane, Province of Pinar del Río, Cuba, December 28, 1916, by Brother León (no. 6901).

A fragmentary specimen of this peculiar grass was collected by Wright "in small skirts of woods bordering the Savana San Julián" in 1865 (no. 3894) and was listed in Sauvalle's *Flora Cubana*¹ without description as "*Muhlenbergia spicata* Munn," and by Hitchcock² as an unidentified specimen. The

¹ Page 191.² Contr. U. S. Nat. Herb. 12: 246. 1909.

few weatherworn spikelets on the Wright specimen were too much broken to permit of diagnosis. Brother León at our request kindly visited the locality and sent us a specimen of this apparently very rare species. His letter in regard to this collection is of interest: "I visited the Savana San Julián in company with Father Modesto Roca of Guanabacoa. The first two days I did not see any kind of *Bouteloua* [from the broken Wright specimen we had guessed it to be a species of that genus], not knowing on what border of the savanna were the skirts of woods, and the savanna has a circuit of 40 to 50 kilometers. At last * * * we went to a small wood (Cayo Gabino) on the northeastern border of the hacienda [of Señor D. J. M. Lamas] and there I saw a tufted grass which I supposed might be the long lost species of Wright, though at first sight it called to my mind the idea of a small *Arthrostylidium*, having some resemblance to my no. 4853 [*Arthrostylidium capillifolium*]. I noted with pleasure that it agreed exactly with your description. Unluckily there remained very few flowers. I entered the wood at different places all around but could not find more of it." It is noteworthy that in his field notes Wright called his no. 3894 "*Arthrostylidium*."

81. *BOUTELOUA* Lag.¹

Spikelets with 1 perfect floret, crowded along 1 side of a narrow rachis, forming short spikes (rarely but a single spikelet to a spike); glumes unequal; fertile lemma rather broad, usually 3 to 5-toothed, commonly mucronate or awned; sterile lemmas usually with 3 awns; spikes racemose, often drooping.

Second floret a trifid naked awnlike rudiment.

Lateral awns of rudiment much shorter than the central one or nearly obsolete ----- 1. *B. vaneedeni*.

Lateral awns of rudiment nearly as long as the central one.

Plants very small; blades not over 1.5 cm. long; spikes less than 5 mm. long ----- 2. *B. juncea*.

Plants in rather large mats; blades commonly 10 cm. long; spikes 2 cm. or more long ----- 3. *B. americana*.

Second floret well developed, the lemma evident.

First floret sterile, the second mostly fertile ----- 4. *B. heterostega*.

First floret fertile, the second sterile ----- 5. *B. disticha*.

1. *Bouteloua vaneedeni* Pilger in Urban, Symb. Antill. 6: 2. 1909.

Very slender, tufted; culms erect, finally producing short fascicled branches; blades involute; inflorescence a very slender raceme 5 to 15 cm. long, of numerous small spikes of few spikelets.

Only known from the island of Anguilla, where the type was collected by Boldingh (no. 3512B).

2. *Bouteloua juncea* (Desv.) Hitchc. Contr. U. S. Nat. Herb. 17: 343. 1913.

Triathera juncea Desv.; Beauv. Ess. Agrost. 40. pl. 9. f. 4. 1812.

Eutriana juncea Trin. Gram. Unifl. 238. 1824.

Eutriana ledebouri Trin. Gram. Unifl. 238. 1824.

Aristida secunda Ledeb.; Trin. loc. cit. as synonym of *Eutriana ledebouri*.

Atheropogon domingensis Spreng. Syst. Veg. 1: 293. 1825.

Triaena juncea Griffiths, Contr. U. S. Nat. Herb. 14: 354. 1912.

¹This genus has recently been revised by Griffiths (Contr. U. S. Nat. Herb. 14: 343-428. 1912), who gives a nearly complete synonymy. Here, therefore, only such synonyms are given as are found in West Indian floras and a few others not included by Dr. Griffiths.

A low delicate perennial, prostrate below, geniculate at the lower nodes, the branches commonly in pairs or fascicles; nodes and summit of the sheaths pillose; blades flat or folded, 8 to 12 mm. long, about 1.5 mm. wide; racemes of few to several minute spikes, the spikelet solitary, pilose at base, 3 to 4 mm. long; glumes lanceolate, acuminate, the first one-third, the second slightly over half the length of the spikelet; fertile lemma narrow, with 3 erect scabrous teeth at the summit, the palea 2-toothed, shorter; sterile floret about equaling the fertile lemma, consisting of 3 slender scabrous awns.

Arid open ground, Haiti (Gonaïves, *Buch* 1910) and Porto Rico (red soil plain, Salinas de Guanica, *Britton, Cowell & Brown* 4918). Originally described from Hispaniola. *Eutriana ledebouri* was described from "Domingo" (though the type specimen, collected by Poiteau, is labeled "Hayti"). Griffiths¹ applies Desvaux's specific name to a Mexican species, *Bouteloua triana* (Trin.) Scribn., basing his judgment on Beauvois's crude illustration, and lists *Eutriana ledebouri* under species excluded from *Bouteloua*. Until recently collected by Buch in Haiti and by Britton, Cowell, and Brown in Porto Rico this species was known only from the collections described by Desvaux and by Trinius. The Mexican *B. triana*, with its spikes of a single spikelet, was apparently the only species to which Beauvois's figure could apply, though the description states that the lemma of the fertile floret is minutely trifid and the figure shows such a lemma. In the Mexican species the lemma is entire, while in Buch's specimen from Haiti the lemma is trifid. Pilger² applies the name "*Bouteloua americana* (Desv.) Pilger" to Buch's collection, basing the name on "*Triathera americana* Desv., excluding synonymy." Desvaux³ described the genus *Triathera* with a single species, *T. americana*, based on "*Aristida americana* Sw." (the same as *A. americana* L., as is shown clearly by Swartz's illustration;⁴ that is, *Bouteloua americana*). Desvaux mentioned no specimen of his own, but later⁵ he emended the generic description, accepting the specific name "*juncea*," as published under his authorship the previous year by Beauvois, and added "Habitat in Hispaniola."

3. *Bouteloua americana* (L.) Scribn. Proc. Acad. Phila. 1891: 306. 1891.

Aristida americana L. Syst. Nat. ed. 10. 2: 879. 1759.

Aristida antillarum Poir. in Lam. Encycl. Suppl. 1: 451. 1810.

Bouteloua litigiosa Lag. Gen. & Sp. Nov. 5. 1816.

Chaetaria antillarum Beauv.; Roem. & Schult. Syst. Veg. 2: 395. 1817.

Aristida subbiflora Steud. Syn. Pl. Glum. 1: 138. 1854.

Eutriana antillarum Steud. Syn. Pl. Glum. 1: 217. 1854.

Bouteloua elatior Griseb. Fl. Brit. W. Ind. 537. 1864.

Aristida adscensionis var. *americana* Kuntze, Rev. Gen. Pl. 3: 340. 1898.

A tufted perennial, the freely branching flattened wiry culms often 60 or 70 cm. long (sometimes longer), decumbent with ascending ends, the narrow blades mostly involute-pointed, the few to several slender, loosely flowered spikes divergent, rather distant.

Open, dry ground, West Indies to Panama and Venezuela. *Aristida americana* (of which *B. litigiosa* is a typonym) was described from Jamaica, *A. antillarum* from the Antilles, *A. subbiflora* from Guadeloupe, and *Bouteloua elatior* from Antigua.

¹ Contr. U. S. Nat. Herb. 14: 424. 1912.

² In Urban, Symb. Antill. 5: 288. 1907.

³ Nouv. Bull. Soc. Philom. Paris 2: 188. 1810.

⁴ Obs. Bot. pl. 2. f. 2. 1791.

⁵ Journ. de Bot. Desv. 1: 67. 1813.

Cuba, Jamaica, Santo Domingo, Porto Rico (the south and west coasts and on Vieques), St. Thomas, St. Croix, St. Jan, Antigua, Montserrat, Guadeloupe, Dominica, Martinique, Barbados, St. Vincent, Grenada, and Tobago.

4. *Bouteloua heterostega* (Trin.) Griffiths, Contr. U. S. Nat. Herb. 14: 414. 1912.

Heterosteca juncifolia Desv. Nouv. Bull. Soc. Philom. Paris 2: 188. 1810.

Eutriana heterostega Trin. Gram. Unifl. 242. 1824.

Bouteloua humboldtiana Griseb. Mem. Amer. Acad. n. ser. 8: 532. 1862.

Bouteloua porphyrantha Wright, Anal. Acad. Cienc. Habana 8: 201. 1871.

Heterosteca rhadina Nash, Bull. Torrey Club 30: 386. 1903.

Similar to the preceding, the blades longer, the spikes broader, usually shorter, the spikelets more closely arranged.

Open ground, West Indies. Originally described from the Antilles, *Heterosteca juncifolia* and *Eutriana heterostega* being typonyms. The type of *Bouteloua humboldtiana* is from Cuba (Wright 734, 739); the type of *Heterosteca rhadina* is from Porto Rico (Heller 6057). *Bouteloua porphyrantha* was based upon Wright 739 in part, 734, and 3816. Griffiths (loc. cit.) selects the first specimen as the type.

Cuba, Haiti, Santo Domingo, and Porto Rico.

5. *Bouteloua disticha* (H. B. K.) Benth. Journ. Linn. Soc. Bot. 19: 105. 1881.

Polyodon distichum H. B. K. Nov. Gen. & Sp. 1: 175. pl. 55. 1816.

Culms elongate, straggling; leaves mostly clustered toward the base; spikes numerous, approximate in long terminal and axillary racemes.

Open ground and dry hills, Pacific coast of Central America to Ecuador; also in the vicinity of Habana, Cuba, where it is apparently introduced. Originally described from Ecuador.

82. TRIPOGON Roem. & Schult.

Spikelets several to many-flowered, sessile, erect in a single spike; glumes shorter than the lowermost floret; lemmas awned from between the lobes of the minutely two-lobed summit.

1. *Tripogon spicatus* (Nees) Ekman, Ark. für Bot. 11⁴: 36. 1912.

Bromus spicatus Nees, Agrost. Bras. 471. 1829.

Tricuspis simplex Griseb. Mem. Amer. Acad. n. ser. 8: 532. 1862.

Leptochloa spicata Scribn. Proc. Acad. Phila. 1891: 304. 1892.

A low, densely tufted perennial, the subfiliform leaves aggregated at the base, the slender culms erect, spikelet-bearing for one-third to half their length.

Sterile hills, Texas to Argentina; also in eastern Cuba (Wright 1551, the type of *Tricuspis simplex*). Originally described from Brazil.

83. ELEUSINE Gaertn.

Spikelets several to many-flowered, densely imbricate in thick spikes, these subdigitate; glumes and lemmas with thickened 5-nerved keels, acute; caryopsis with a thin pericarp marked with fine transverse lines.

1. *Eleusine indica* (L.) Gaertn. Fruct. & Sem. 1: 8. 1788.

GOOSE GRASS.

Cynosurus indicus L. Sp. Pl. 72. 1753.

A weedy annual with spreading or ascending flattened branching culms, thin flat linear blades, and 2 to several spikes (sometimes one spike 1 to 3 cm. below) 5 to 10 cm. long.

Open ground and waste places. A common weed of warm and warm-temperate regions. Introduced in America; originally described from India. To

be found on all the West Indian islands. In Cuba called "pata de gallina" and "grama de caballo."

84. DACTYLOCTENIUM Willd.

Spikelets as in Eleusine, but the glumes and lemmas mucronate or awn-tipped; apex of the rachis extending as a point beyond the spikelets.

1. *Dactyloctenium aegyptium* (L.) Richt. Pl. Eur. 1: 68. 1870.

CROWFOOT GRASS.

Cynosurus aegyptius L. Sp. Pl. 72. 1753.

Dactyloctenium meridionale Hamilt. Prodr. Pl. Ind. Occ. 6. 1825.

A weedy stoloniferous, more or less pilose annual, often forming dense mats, the flat culms 10 to 50 cm. long, the blades flat, usually short, the spikes 2 to 4, short, thick, radiate at the apex of the culm.

Open ground and waste places. A common weed in warm countries. Introduced in America; originally described from "Africa, Asia, America." To be found on all the West Indian islands. In Cuba called "pata de gallina."

85. LEPTOCHLOA Beauv.¹

Spikelets few to many-flowered, short-pedicellate, appressed, loosely imbricate along a narrow rachis, forming slender racemes, these numerous in an elongate panicle; glumes and lemmas keeled, the lemmas 3-nerved.

Plants annual.

Sheaths, at least the upper, papillose-hispid-----1. *L. filiformis*.

Sheaths glabrous.

Spikes distinctly unilateral, numerous and crowded in a narrow elongate inflorescence; sheaths minutely scabrous-----2. *L. scabra*.

Spikes indistinctly unilateral, few to several in a somewhat flabellate inflorescence; sheaths smooth.

Lemmas bearing a delicate awn-----3. *L. fascicularis*.

Lemmas awnless or minutely mucronate-----4. *L. uninervia*.

Plants perennial.

Spikes slender, 15 to 20 cm. long, the spikelets rather distant; collar densely hirsute-----8. *L. longa*.

Spikes mostly less than 10 cm. long, the spikelets crowded; collar glabrous or slightly pubescent.

Spikes 2 to 3 cm. long, appressed in a long narrow inflorescence; lemmas awnless-----5. *L. nealleyi*.

Spikes mostly over 5 cm. long, somewhat flexuous and spreading in an oblong or flabellate inflorescence; lemmas mucronate or awned.

Sheaths and blades glabrous, usually somewhat glaucous; awnless or the awns shorter than body of lemma-----6. *L. virgata*.

Sheaths sparsely papillose-hispid; blades sparsely villous on the upper surface near the base; awns or some of them about as long as their lemmas-----7. *L. domingensis*.

1. *Leptochloa filiformis* (Lam.) Beauv. Ess. Agrost. 71, 166. 1812.

Festuca filiformis Lam. Tabl. Encycl. 1: 191. 1791.

Eleusine mucronata Michx. Fl. Bor. Amer. 1: 65. 1803.

Rabdochloa? mucronata Beauv. Ess. Agrost. 84, 176. 1812.

¹ For an account of the North American species see A. S. Hitchcock, North American species of *Leptochloa*. U. S. Dept. Agr. Bur. Pl. Ind. Bull. 33. 1903.

Leptochloa mucronata Kunth, Rév. Gram. 1: 91. 1829.

Leptochloa brachiata Steud. Syn. Pl. Glum. 1: 209. 1854.

Culms ascending or erect, geniculate below, branching at the base, commonly 40 to 70 cm. tall (dwarf specimens 10 to 20 cm. tall); blades thin, flat; racemes very slender, spreading.

Fields and open ground, Virginia to California, south to South America. Originally described from tropical America. *Eleusine mucronata* was described from Illinois; *Leptochloa brachiata* from Guadeloupe. A common weed in fields throughout the West Indies, except the Bahamas. *Leptochloa mucronata* var. *multiflora* Eggers¹ is listed, without description, from St. Croix.

2. *Leptochloa scabra* Nees, Agrost. Bras. 435. 1829.

Resembling the preceding but the inflorescence narrower, commonly taller and more robust, the spikes less slender, ascending, flexuous, the spikelets larger.

Ditches and shallow swamps, Louisiana, Porto Rico, Trinidad, Tobago, and Central America, to Brazil, whence originally described.

3. *Leptochloa fascicularis* (Lam.) A. Gray, Man. 588. 1848.

Festuca fascicularis Lam. Tabl. Encycl. 1: 189. 1791.

Festuca polystachya Michx. Fl. Bor. Amer. 1: 66. 1803.

Semiaquatic; culms tufted, 30 to 100 cm. tall, branching, the subinvolute blades overtopping the inflorescence; spikelets 7 to 9 mm. long, the florets awn-tipped.

Ditches and moist ground, United States, Mexico, and the West Indies. Originally described from South America.

Bahamas (New Providence, Great Exuma), Cuba, Jamaica, and St. Croix.

4. *Leptochloa uninervia* (Presl).

Megastachya uninervia Presl, Rel. Haenk. 1: 283. 1830.

Diplachne verticillata Nees & Mey. Nov. Act. Nat. Cur. 19. Suppl. 1: 158. 1843.

Atropis carinata Griseb. Abh. Ges. Wiss. Göttingen 24: 291. 1879.

Leptochloa imbricata Thurb. Bot. Calif. 2: 293. 1880.

Leptochloa virletii Fourn. Mex. Pl. 2: 147. 1886.

Diplachne tarapacana Phil. Anal. Mus. Nac. Chili Bot. 8: 88. 1891.

Rabdochloa imbricata Kuntze, Rev. Gen. Pl. 3: 788. 1891.

Diplachne carinata Hack. Bol. Acad. Nac. Cienc. Córdoba 16: 253. 1900.

Similar to *L. fascicularis* in habit, the racemes rather more densely flowered, the lemmas obtuse.

Ditches and wet open ground, southwestern United States and south to Argentina and Chile. In the West Indies known only from Jamaica (Salt Ponds, Harris 12309, 12311).

Originally described from Mexico; *Diplachne verticillata* and *D. tarapacana* were described from Chile, *Leptochloa imbricata* from California, *L. virletii* from Mexico, and *Atropis carinata* from Argentina.

5. *Leptochloa nealleyi* Vasey, Bull. Torrey Club 12: 7. 1885.

Leptochloa stricta Fourn. Mex. Pl. 2: 147. 1886.

Tall, slender, glabrous, the culms flattened, the sheaths keeled, the involute blades scabrous; panicle long, narrow, the pale densely flowered suberect racemes commonly 2 to 3 cm. long.

Wet woods, Texas, Mexico, and Cuba (Tiffin, Shafer 2904). Originally described from Texas. *Leptochloa stricta* was described from Veracruz, Mexico.

6. *Leptochloa virgata* (L.) Beauv. Ess. Agrost. 166. 1812.

Cynosurus virgatus L. Syst. Nat. ed. 10. 2: 87. 1759.

¹ Vidensk. Medd. Naturhist. Forening. Copenhagen III. 8: 151. 1876.

Eleusine virgata Pers. Syn. Pl. 1: 87. 1805.

Leptostachys virgata Meyer, Prim. Fl. Esseq. 74. 1818.

Oxydenia virgata Nutt.; Hook. & Jacks. Ind. Kew. 2: 392. 1894.

Leptochloa perennis Hack. Inf. Est. Centr. Agron. Cuba 1: 411. 1906.

Culms in small tufts, tall, slender, strong and wiry, sparingly branching; blades flat; racemes commonly about 10 cm. long, lax, ascending, aggregated toward the summit of the culm.

Open ground and grassy slopes, Mexico and the West Indies to South America. Originally described from Jamaica. *Leptochloa perennis* was described from Cuba, the type being Baker 4617 from La Magdalena. To be found on probably all of the West Indian islands.

7. *Leptochloa domingensis* (Jacq.) Trin. Fund. Agrost. 133. 1820.

Cynosurus domingensis Jacq. Misc. 2: 363. 1781.

Rabdochloa domingensis Beauv. Ess. Agrost. 84, 176. 1812.

Leptochloa virgata gracilis Nees; Griseb. Fl. Brit. W. Ind. 538. 1864.

Leptochloa virgata domingensis Link; Griseb. Fl. Brit. W. Ind. 538. 1864.

Resembling the preceding, the panicles more elongate, the racemes more numerous.

Open ground and grassy banks, Florida, Mexico, and the West Indies. Original locality not given, presumably Santo Domingo.

Bahamas (New Providence, Eleuthera), Cuba, Jamaica, Haiti, Santo Domingo, Antigua, Saba, Guadeloupe, Martinique, St. Vincent, and Trinidad.

8. *Leptochloa longa* Griseb. Fl. Brit. W. Ind. 538. 1868.

Culms commonly 1.5 meters tall, geniculate below, robust; blades 1.5 to 2.5 cm. wide, the long spreading, loosely flowered racemes mostly in distant fascicles.

Rich shady banks, Trinidad (San Fernando, Manzanilla), the type locality.

86. GOUINIA Fourn.

Spikelets few-flowered, short-pedicellate, appressed, in slender elongate racemes, these paniculate; glumes and lemmas keeled, the lemmas bearded at the base, awned.

1. *Gouinia virgata* (Presl) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 10. 1897.

Bromus virgatus Presl, Rel. Haenk. 1: 263. 1830.

Festuca laxiflora A. Rich. in Sagra, Hist. Cuba 11: 318. 1850.

Festuca fournieriana Hemsl. Biol. Centr. Amer. Bot. 3: 581. 1885.

Gouinia polygama Fourn. Mex. Pl. 2: 103. 1886.

A scrambling perennial with slender wiry culms more than a meter long, thin long flat blades, and large few-flowered panicles of few to several remote divergent racemes with rather large spikelets.

Rocky brushy slopes, Mexico and Province of Habana, Cuba. Originally described from "Peru and Mexico," but the former locality probably an error. *Gouinia polygama* was also described from Mexico. *Festuca fournieriana* is a change of name based upon Fournier's then unpublished name. *Festuca laxiflora* was described from Habana.

87. OPIZIA Presl.

Plants monœcious (sometimes diœcious); pistillate spikelets in a single loose 1-sided spike; first glume minute or obsolete; second glume nearly as long as the floret; fertile lemma subindurate, broad, 3-awned, inclosing a broad palea with

keels crested above, the rachilla joint below the 3-awned rudimentary floret adnate to the lower part of the keel; staminate spikelets awnless, imbricate in short spikes, these racemose.

1. *Opizia stolonifera* Presl, Rel. Haenk. 1: 293. *pl.* 41. *f.* 1. 1830.

A low stoloniferous perennial forming dense mats, the shoots on the stolons mostly fascicled, the slender flowering culms 5 to 10 cm. tall; blades flat; pistillate spikes short-exserted, the 1 to 3 racemose staminate spikes long-exserted.

Open ground and pastures, southern Mexico and vicinity of Habana, Cuba. Originally described from Acapulco.

88. PAPPOPHORUM Schreb.

Spikelets 1 to 3-flowered, the upper sterile; glumes thin, subequal; lemma subindurate, dissolving at the summit into about 13 slender awns, the second and third florets reduced, closely appressed to the palea, the awns of all the florets together forming a pappus-like crown, falling attached to the fruit.

1. *Pappophorum alopecuroideum* Vahl, Symb. Bot. 3: 10. 1794.

Pappophorum laguroideum Schrad.; Schult. Mant. 2: 342. 1824.

A tufted glabrous perennial with erect culms 1 meter or more tall, long involute blades, and pale elongate spikelike, densely flowered panicles softly bristly from the numerous delicate awns.

Rocky soil, southern Mexico to South America and the West Indies. Vahl states as to the origin of his type specimen, "Ad fodinas Insulae Spanish Town Americae legit Du. v. Rohr."¹ This may refer to Spanish Town, Jamaica, but we have no specimens from that island. *Pappophorum laguroideum* was described from the West Indies.

Cuba (Province of Habana), Porto Rico (Punta Aguila and on Desecheo and Mona Islands), St. Thomas, Guadeloupe, Dominica, Martinique, and Trinidad.

89. MONANTHOCHLOË Engelm.

Plants diœcious; spikelets 2 or 3-flowered, usually sessile in pairs, concealed in the upper sheaths; glumes leaflike, rigid, with membranaceous sheaths and short, strongly veined spreading blades, the first about equaling the uppermost floret; lemmas rather rigid, the palea with winged keels.

1. *Monanthochloë littoralis* Engelm. Trans. Acad. St. Louis 1: 436. 1859.

A low, extensively creeping, wiry perennial with erect, commonly paired branches and crowded short rigid squarrose blades, the inconspicuous spikelets hidden in the upper leaves.

Muddy seacoasts of the warmer parts of America, often forming extensive colonies. Originally described from Texas. Found in Cuba at Cayo Cruz (*Shafer* 2773).

90. GYNERIUM Humb. & Bonpl.

Plants diœcious; spikelets several-flowered; pistillate spikelets with long-attenuate glumes and smaller long-silky lemmas; staminate spikelets with shorter glumes and glabrous lemmas.

¹ De Rohr was inspector of agriculture in the island of St. Croix. He visited Jamaica, Martinique, Surinam, Cartagena, Cayenne, and St. Martha, his plants going mostly to Vahl. (See Lasègue, Mus. Bot. Deless. 489. 1845.)

1. *Gynerium sagittatum* (Aubl.) Beauv. Ess. Agrost. 138. pl. 24. f. 6. 1812.¹

UVA GRASS.

Saccharum sagittatum Aubl. Pl. Guian. 1: 50. 1775.

Gynerium saccharoides Humb. & Bonpl. Pl. Aequin. 2: 112. pl. 115. 1809.

Arundo saccharoides Poir. in Lam. Encycl. Suppl. 4: 703. 1816.

Stout reeds often 10 meters tall, with culms clothed below with old sheaths, the blades having fallen, sharply serrulate blades, commonly 2 meters long and 4 to 6 cm. wide (forming a great fan-shaped summit to the sterile culms), and pale plummy densely flowered panicles 1 meter or more long, the main axis erect, the branches drooping.

River banks and low ground, forming dense colonies, West Indies and southern Mexico to South America. Originally described from French Guiana. *Gynerium saccharoides* was described from Cumaná, Venezuela. Found throughout the West Indies except the Bahamas. Called "wild cane," and in Cuba "caña de Castilla."

91. ARUNDO L.

Spikelets perfect, 2 to several-flowered; glumes about equaling the spikelet; lemmas bidentate, cuspidate between the teeth and with long silky hairs on the back; rachilla naked.

1. *Arundo donax* L. Sp. Pl. 81. 1753.

GIANT REED.

Donax arundinaceus Beauv. Ess. Agrost. 78, 161. pl. 16. f. 4. 1812.

Tall reeds with strong sparingly branching culms, elongate scabrous-margined flat blades, and densely flowered, slightly drooping panicles 30 to 60 cm. long, the spikelets about 1 cm. long.

River banks and moist ground, warmer parts of the Old World. Cultivated in America for ornament and occurring from Texas to California and southward to South America as an escape. Originally described from southwestern Europe. Found on nearly all of the West Indian islands, including Bermuda and the Bahamas. In Cuba called "güfn."

92. PHRAGMITES Trin.

Spikelets 2 to several-flowered, the lowest floret staminate or neuter, its lemma elongate; glumes shorter than the florets; lemmas acuminate; rachilla densely clothed with long silky hairs.

1. *Phragmites phragmites* (L.) Karst. Deutsch. Fl. 378. 1883.

REED GRASS.

Arundo phragmites L. Sp. Pl. 81. 1753.

Arundo occidentalis Sieber; Schult. Mant. 2: 289. 1824.

Phragmites martinicensis Trin.; Steud. Nom. Bot. ed. 2. 2: 324. 1841.

Resembling *Arundo donax* but stoloniferous, panicle more open and drooping.

Swamps throughout the temperate regions of the world, extending into the Tropics. Originally described from Europe. *Arundo occidentalis* and *Phragmites martinicensis* are based on Sieber 31 from Martinique. Called sometimes "wild cane."

Bahamas (New Providence, Andros), Jamaica, Santo Domingo, Porto Rico, Guadeloupe, Martinique, and Tobago.

¹ This name is based indirectly upon *Saccharum sagittatum* Aubl. Beauvois (op. cit. 153) refers "*Arundo sagittata* Aubl., Pers." to *Gynerium*. Under *Gynerium* he gives as synonym "*Arundinis spec. Aubl.*" and makes the combination "*Gy. sagittatum*." The species was described by Persoon (Syn. Pl. 1: 102. 1805) under *Arundo* and by Aublet under *Saccharum*.

93. ERAGROSTIS Host.

Spikelets few to many-flowered, strongly compressed; glumes and lemmas keeled, the lemmas 3-nerved; rachilla often continuous, the paleas usually persistent after the fall of the fruit.

Palea ciliate on the keels, the cilia usually as long as the width of the lemma.

Plants perennial; cilia rather soft, approximate-----3. *E. leonina*.

Plants annual; cilia stiff and somewhat distant.

Spikelets about 2 mm. long-----1. *E. amabilis*.

Spikelets usually 3 to 4 mm. long, sometimes many-flowered, mostly subsessile; panicle close and spikelike or, in var. *laxa*, somewhat lax and open-----2. *E. ciliaris*.

Palea not ciliate on the keels.

Spikelets dioecious; plants creeping-----4. *E. hypnoides*.

Spikelets perfect; plants not creeping.

Plants annual.

Lemmas glandular on the keel-----7. *E. cilianensis*.

Lemmas not glandular.

Margins of blades glandular-----8. *E. eragrostis*.

Margins of blades not glandular.

Panicle elongate, contracted, the minute spikelets crowded or glomerate-----10. *E. glomerata*.

Panicle not elongate, at least half as wide as long, the spikelets not crowded.

Spikelets 1.5 mm. wide-----5. *E. pilosa*.

Spikelets 2 mm. wide.

Spikelets ovate-lanceolate, mostly less than 5 mm. long; panicle rather lax.

6. *E. tephrosanthos*.

Spikelets linear, mostly 8 to 10 mm. long; panicle rather firm, the branches and branchlets somewhat stiffly and divaricately spreading.

9. *E. barrelieri*.

Plants perennial; spikelets 4 to 10 mm. or more long.

Plants low, mostly not over 20 cm. high, the culms wiry.

Inflorescence a strict raceme, the spikelets subsessile, rather remote-----12. *E. bahamensis*.

Inflorescence a narrow or open panicle.

Panicle branches viscid-----11. *E. glutinosa*.

Panicle branches not viscid.

Sheaths glabrous-----13. *E. cubensis*.

Sheaths sparsely pilose-----14. *E. berteroniana*.

Plants taller, often robust, over 30 cm. tall.

Branchlets of panicle elongate, capillary, stiffly spreading, bearing mostly single terminal spikelets--15. *E. elliottii*.

Branchlets of panicle bearing several mostly short-pediceled spikelets.

Lemmas acuminate; axils of panicle with a tuft of long hairs-----16. *E. acutiflora*.

Lemmas acute; axils of panicle naked or but rarely bearing a few hairs.

Plants rather slender, mostly less than 0.5 meter tall; blades about 1 mm. wide; panicle open, the spikelets on slender spreading pedicels.

17. *E. purpurascens*.

Plants robust, mostly more than 0.5 meter tall; blades more than 1 mm. wide; panicle open or somewhat condensed-----18. *E. prolifera*.

1. *Eragrostis amabilis* (L.) Wight & Arn.; Hook. & Arn. Bot. Beechey Voy. 251. 1841.

Poa amabilis L. Sp. Pl. 68. 1753.

Poa plumosa Retz. Obs. Bot. 4: 20. 1786.

Eragrostis plumosa Link, Hort. Berol. 1: 192. 1827.

A low tufted branching annual, with slender ascending or spreading culms, linear blades, and handsome oblong panicles, the spikelets mostly borne along the lower side of the ascending branches.

Open ground and waste places, warmer regions of both hemispheres. A native of the Old World. Originally described from India. *Poa plumosa* was described from the East Indies.

Cuba, Jamaica (Hope Gardens), Porto Rico (Pastillo Springs), St. Jan, St. Kitts, Montserrat, Guadeloupe, Martinique, St. Vincent, Grenada, Trinidad, and Tobago.

2. *Eragrostis ciliaris* (L.) Link, Hort. Berol. 1: 192. 1827.

Poa ciliaris L. Syst. Nat. ed. 10. 2: 875. 1759.

Differs from the preceding in the dense narrow panicles, interrupted below, and in the larger crowded subsessile spikelets. The inflorescence of this species varies from the rather dense cylindrical panicle with short branches flowered to the base (the typical form) to one with stiffly ascending branches naked at base (such as *Curtiss* 76, Nassau, Bahamas) and to that with a lax panicle (*E. ciliaris laxa*). A form apparently confined to the Bahamas has a nearly simple panicle with elongate spikelets having (in the most extreme specimen, *Wilson* 7608, Caicos Islands) as many as 18 florets. This may represent a distinct species, but no other differentiating character appears to be correlated with the long spikelets. Another possibly distinct form is represented by *Shafer* 2751 (Cayo Paredon Grande, Camaguey, Cuba), with delicate culms 20 to 30 cm. long, blades not over 1 mm. wide, and open, relatively few-flowered panicles.

Open ground and waste places, warmer regions of both hemispheres. Apparently introduced in America, originally described from Jamaica. A common weed around towns. To be found on probably all the West Indian islands.

ERAGROSTIS CILIARIS BRACHYSTACHYA Boiss. Fl. Orient. 5: 582. 1884. *E. arabica* Jaub. & Spach, Illustr. 4: 31. pl. 322. 1850-53. This variety is common in Curaçao and the neighboring islands. The panicles are dense and ovoid. Forms approaching this are sometimes found in the West Indies (Morillos de Cabo Rojo, Porto Rico, *Britton, Cowell & Brown* 4713).

- 2a. *Eragrostis ciliaris laxa* Kuntze, Rev. Gen. Pl. 2: 774. 1891.

Panicle branches sometimes 3 cm. long, the spikelets scarcely crowded. In the specimens from the Lesser Antilles the cilia on the keels are short.

Habitat the same as for the species. Apparently confined to the West Indies. Originally described from St. Thomas, Barbados, and Trinidad.

Cuba, Jamaica, Dominica, and Martinique.

3. *Eragrostis leonina* sp. nov.

Perennial, cespitose; culms wiry, glabrous, erect or somewhat spreading, 20 to 60 cm. long, sparingly branching; sheaths glabrous, usually sparsely pilose

at the throat; ligule membranaceous, ciliate, 0.3 mm. long; blades glabrous or sparsely pilose, drying involute, attenuate-acuminate, 3 to 8 cm. long, 1 to 2 cm. wide; panicles oblong, rather loosely flowered, mostly 10 to 15 cm. long, the branches stiffly ascending, rather distant, single, spikelet-bearing from above the base, the lower 2 to 4 cm. long; axis and branches scabrous, the turgid pulvini pilose; spikelets tawny, linear, 3 to 4 mm. long, 6 to 10-flowered, the rachilla breaking up between the florets; glumes acute or subacute, scabrous on the keels, the first 1 mm. long, the second slightly longer; lemmas oblong, obtuse, minutely roughened, 1.3 mm. long, prominently 3-nerved, the lateral nerves two-thirds the distance from keel to margin; palea as long as the lemma, deciduous with it, ciliate on the keels, the cilia less than half as long as the width of the lemma.

Type in the U. S. National Herbarium, no. 865555, collected in thickets near railroad, at Zaza de Tunas, Province of Santa Clara, Cuba, August 25, 1909, by Brother León (no. 885). The only other specimen seen is *Britton* 2374, collected in palm barrens at Camaguey, Cuba.

This is the only perennial species we know having a ciliate palea.

4. *Eragrostis hypnoides* (Lam.) B. S. P. Prel. Cat. N. Y. 69. 1888.

Poa hypnoides Lam. Tabl. Encycl. 1: 185. 1791.

Poa reptans Michx. Fl. Bor. Amer. 1: 69. 1803.

Eragrostis reptans Nees, Agrost. Bras. 514. 1829.

Stoloniferous, forming mats, the flowering culms mostly 5 to 10 cm. tall; blades 1.5 to 2 cm. long, spreading; panicles small, more or less capitate, the pale, many-flowered spikelets commonly 1 cm. long.

Moist, open ground along streams throughout the United States and southward to Brazil. Originally described from tropical America. *Poa reptans* was described from Illinois.

Cuba, Santo Domingo, Porto Rico, and Trinidad.

5. *Eragrostis pilosa* (L.) Beauv. Ess. Agrost. 162. 1812.

Poa pilosa L. Sp. Pl. 68. 1753.

A tufted weedy annual, pilose at the summit of the sheaths and in the axils of the lower panicle branches, otherwise glabrous; culms ascending, mostly 20 to 30 cm. tall; panicles oblong, loosely many-flowered, commonly about one-third the entire height of the plant; spikelets about 4 mm. long.

Open grounds, fields, and waste places, warm and temperate regions of both hemispheres. Originally described from Italy. The West Indian specimens referred to this species are the form with more delicate, slender, flexuous panicle branches, apparently commoner in Asia and Africa than in Europe. Nash¹ doubtfully refers these specimens to *Eragrostis purshii* Schrad.

Cuba, Jamaica, Porto Rico (Bayamon), St. Croix, Guadeloupe, Dominica, Martinique, St. Vincent, Grenada, Barbados, and Tobago.

6. *Eragrostis tephrosanthos* Schult. Mant. 2: 316. 1824.

Eragrostis delicatula Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2¹: 73. 1836.

In habit like the preceding, the culms usually lower, the panicles broader, often half the entire height of the plant.

Open ground, fields, and waste places, West Indies to Brazil. Originally described from Martinique. *Eragrostis delicatula* was described from Rio de Janeiro. Common in the Greater Antilles and Trinidad; less common in the Lesser Antilles. In Cuba called "ilusión."

Grisebach² refers this species to *E. poaeoides* Beauv.

¹ Bull. Torrey Club 30: 388. 1903.

² Fl. Brit. W. Ind. 532. 1864.

7. *Eragrostis cilianensis* (All.) Link; Vign. Lut. Malpighia 18: 386. 1904.¹*Poa cilianensis* All. Fl. Pedem. 2: 246. 1785.*Eragrostis major* Host, Icon. Gram. Austr. 4: 14. 1809.*Eragrostis megastachya* Link, Hort. Berol. 1: 187. 1827.

Culms erect or often spreading; panicles rather compact, 2 to 10 cm. long, greenish or often whitish, the spikelets many-flowered, larger than in the other annual species; plant giving off a disagreeable odor.

A common weed in the United States. Originally described from Europe. Found in Bermuda.

8. *Eragrostis eragrostis* (L.) Karst. Deutsch. Fl. 389. 1883.*Poa eragrostis* L. Sp. Pl. 68. 1753.

Culms ascending, 30 to 40 cm. long; blades scabrous above; panicles oblong, rather loosely flowered, the pale spikelets 5 to 7 mm. long.

A European species introduced in the United States; found in Haiti and Martinique.

9. *Eragrostis barrelieri* Daveau, Journ. de Bot. 8: 289. 1894.

Much like *E. eragrostis* in habit; small axillary panicles commonly borne in the sheaths.

An Old World species introduced in Texas and St. Croix.

10. *Eragrostis glomerata* (Walt.) L. H. Dewey, Contr. U. S. Nat. Herb. 2: 543. 1894.*Poa glomerata* Walt. Fl. Carol. 80. 1788.*Poa conferta* Ell. Bot. S. C. & Ga. 1: 158. 1816.*Eragrostis conferta* Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 409. 1830.

Robust, sometimes as much as 2 meters tall and appearing like a perennial, freely branching, the branches sometimes fascicled; blades elongate; panicles as much as 40 cm. long, narrowly contracted, densely flowered, the spikelets minute.

Moist, low ground, southeastern United States to Uruguay. *Poa glomerata* and *P. conferta* were described from South Carolina.

In the West Indies known from Trinidad only, where it forms colonies in damp places in the western part of the island from Port of Spain to La Brea.

11. *Eragrostis glutinosa* (Swartz) Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 397. 1830.*Poa glutinosa* Swartz, Prodr. Veg. Ind. Occ. 26. 1788.*Eragrostis sudans* Griseb. Cat. Pl. Cub. 227. 1866.

Low, tufted, the wiry ascending culms about 10 cm. tall, branching; blades involute, nearly equaling the small open panicles, the axis and branches viscid, seeds and dirt adhering to them.

Sandy soil, Cuba and Jamaica. Originally described from the latter island. *Eragrostis sudans* was described from Cuba, the type being Wright 3422.

12. *Eragrostis bahamensis* Hitchc. Rep. Mo. Bot. Gard. 4: 149. 1893.

Tufted, usually about 15 cm. tall, the spreading simple wiry culms spikelet-bearing about half their length, the spikelets appressed or ascending, 6 to 8 mm. long, firm and hard, mostly solitary; blades involute, firm, a woolly tuft on the auricles at the summit of the sheath.

Rocky soil, Bahamas; originally described from Inagua.

Bahamas (Calcos, Acklin, Inagua, Little Inagua, Rum Cay, Turks Island).

¹ For synonymy and discussion see Hubbard, Philippine Journ. Sci. C. Bot. 8: 159. 1913.

13. *Eragrostis cubensis* Hitchc. Contr. U. S. Nat. Herb. 12: 243. 1909.

Similar to the preceding, commonly taller, the culms branching, the blades laxer; inflorescence a nearly simple panicle, the spikelets longer, less firm. Immature or depauperate specimens may be distinguished from *E. bahamensis* by the pilose, not woolly, tapering or truncate, not auricled summit of the sheath.

Sandy or rocky soil, Cuba and Jamaica (Lititz and Southern Manchester). Described from Cuba, *Curtiss* 420, from the Isle of Pines, being the type. Grisebach¹ refers this species to *E. bahiensis* Schrad.

14. *Eragrostis berteroniana* (Schult.) Steud. Nom. Bot. ed. 2. 1: 562. 1840.

Megastachya berteroniana Schult. Mant. 2: 330. 1824.

Poa berteroniana Kunth, Rév. Gram. 1: 112. 1829.

This little-known species was described from Santo Domingo, where it was collected by Bertero. There is in the Krug and Urban Herbarium a portion of the type specimen which was received from the Sprengel Herbarium. There is also in the Trinius Herbarium a specimen from the same collection. No other collections have been seen. The species differs from *Eragrostis cubensis* in having villous sheaths and a more open panicle.

15. *Eragrostis elliotii* S. Wats. Proc. Amer. Acad. 25: 140. 1890.

Poa nitida Ell. Bot. S. C. & Ga. 1: 162. 1816, not *Poa nitida* Lam. 1791, nor *Eragrostis nitida* Link, 1827.

Eragrostis macropoda Pilger in Urban, Symb. Antill. 4: 106. 1903.

Tufted, about 50 cm. tall, the rather stiff leaves mostly clustered toward the base, the very diffuse few-flowered panicle more than half the entire height of the plant, the panicle axis and the capillary branches fragile.

Sandy savannas and sterile hills, southeastern United States on the Coastal Plain and in the West Indies. Originally described from South Carolina. *Eragrostis macropoda* was described from Cataño, Porto Rico (*Sintenis* 1233), the author differentiating it from "*E. elliotii*" by the elongate pedicels. Pilger's observations, however, show that he was really distinguishing it from *E. refracta* (Muhl.) Scribn., which he supposed to be *E. elliotii*.

Bahamas (New Providence, Abaco, Eleuthera), Cuba, Jamaica (Lititz and Southern Manchester), Santo Domingo, Porto Rico, and St. Thomas.

16. *Eragrostis acutiflora* (H. B. K.) Nees, Agrost. Bras. 501. 1829.

Poa acutiflora H. B. K. Nov. Gen. & Sp. 1: 161. 1816.

Tufted, rather rigid, with sparingly branching culms and erect blades, the short-pediceled spikelets approximate along the distant, stiffly spreading primary panicle branches.

Ditches and open moist soil, northern South America. Found in Trinidad (Piarco Savanna, *Hitchcock* 10344). Originally described from Colombia.

17. *Eragrostis purpurascens* (Spreng.) Schult. Mant. 2: 317. 1824.

Poa purpurascens Spreng. Nov. Prov. Hal. 33. 1819.

Culms ascending or spreading, sparingly branching below; panicles commonly about one-third the entire height of the plant, about two-thirds as wide as long, the slender flexuous branches, branchlets, and pedicels divergent; spikelets about 8 mm. long, dark-colored, the lemmas thin, the lateral nerves obscure.

Open ground and rocky hills, Brazil to Argentina; also in Antigua (*Duss* 3; *Wulfschlaegel* 644). Originally described from Uruguay. This is the species described by Grisebach¹ as *Eragrostis prolifera*. The plants from Antigua

¹ Fl. Brit. W. Ind. 532. 1864.

agree with Nees's description of *Eragrostis purpurascens*¹ and with the Sello specimen cited by him.

18. *Eragrostis prolifera* (Swartz) Steud. Syn. Pl. Glum. 1: 278. 1854.

Poa prolifera Swartz, Prodr. Veg. Ind. Occ. 27. 1788.

Poa domingensis Pers. Syn. Pl. 1: 88. 1805.

Eragrostis gigantea Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 403. 1830.

Eragrostis domingensis Steud. Syn. Pl. Glum. 1: 278. 1854.

Eragrostis excelsa Griseb. Cat. Pl. Cub. 227. 1866.

Culms often in large clumps, erect, sometimes stoloniferous, commonly robust, as much as 2 meters tall, the branches sometimes fascicled; blades elongate, involute toward the ends; panicles large, open, or somewhat contracted, the spikelets pale, usually many-flowered. Specimens of this species from the West Indies rarely show indication of stolons, and the branches are but sparingly fascicled. At Cartagena, Colombia, where the species is abundant on the sand spit, the plants develop extensive stolons with tufts of branches, suggesting the name "*prolifera*."

Sandy soil near the coast, West Indies and northern South America. *Poa prolifera* was originally described from "Insulae caribaeae." Swartz later² gives as the localities, "Lucia, Guadeloupe." *Poa domingensis* and *E. gigantea* were described from Santo Domingo and *E. excelsa* from Cuba, the type being Wright 3425 from Toscana, Pinar del Río.

Bahamas (Whale Cay), central and western Cuba, Grand Cayman, southeastern Jamaica, Haiti, Guadeloupe, and Martinique.

94. SENITES Adans.

Spikelets few to several-flowered, the lowest floret perfect, the others staminate, the rachilla joint between the perfect and staminate florets elongate; glumes and fertile lemma herbaceous, broad, with transverse veins between the nerves, obtuse or truncate, the glumes about half as long as the lemma; sterile lemmas membranaceous, narrower, acute.

Culms upright at the base; summit of the sheaths glabrous.....1. *S. zeugites*.
Culms trailing; summit of the sheaths as well as of the petioles bearing stiff hairs.....2. *S. haitiensis*.

1. *Senites zeugites* (L.) Nash; Hitchc. Contr. U. S. Nat. Herb. 12: 127. 1908.

Apluda zeugites L. Syst. Nat. ed. 10. 2: 1306. 1759.

Zeugites jamaicensis Raeuschel, Nom. Bot. ed. 3. 270. 1797, nomen nudum.

Zeugites americana Willd. Sp. Pl. 4: 204. 1805.

A loosely tufted branching glabrous clambering perennial 0.5 to 1 meter tall; culms glossy brown or black, resembling fern stipes; blades on slender, often spreading petioles, ovate, 2.5 to 4 cm. long; panicles mostly 5 to 7 cm. long, loosely flowered, the branches and pedicels capillary; glumes and fertile lemma truncate.

Rich woods, above 1,000 meters altitude. Blue Mountains, Jamaica. Described from Jamaica.

2. *Senites haitiensis* (Pilger).

Zeugites americana subsp. *haitiensis* Pilger in Urban, Symb. Antill. 6: 3. 1909.

Culms very slender, trailing, rooting at the nodes; blades ovate, about 2 cm. long; glumes and fertile lemma abruptly tapering at summit. Known only

¹ Agrost. Bras. 506. 1829.

² Fl. Ind. Occ. 1: 216. 1797.

from the type specimen collected in 1896 by Picarda (no. 1523) on Mount Furcy, Haiti.

95. ORTHOCLADA Beauv.

Spikelets articulated below the glumes, 1-flowered with a prolongation of the rachilla, or 2-flowered, the florets distant; glumes and lemmas acuminate.

1. *Orthoclada laxa* (Rich.) Beauv.; Nees, Agrost. Bras. 522. 1829.

Aira laxa Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792.

Panicum rariflorum Lam. Encycl. 4: 746. 1798.

Orthoclada rariflora Beauv. Ess. Agrost. 69. pl. 14. f. 9. 1812.

A stoloniferous perennial; flowering culms ascending, leafy, simple, commonly 1 meter long; blades slender-petioled, lanceolate, mostly 12 to 15 cm. long, about 2.5 cm. wide; panicle large, as broad as long, the long slender naked branches and capillary branchlets at first erect, finally stiffly divergent, bearing 1 to few spikelets at the extremities.

Rich woods, southern Mexico to Brazil; also in Guadeloupe and Trinidad. Originally described from Cayenne. *Panicum rariflorum* was also described from Cayenne.

96. STREPTOGYNE Beauv.

Spikelets several-flowered, subsessile in a long one-sided raceme; glumes unequal, much shorter than the elongate terete callus-tipped florets; lemmas firm, tapering into a slender awn; palea about as long as the lemma; stigmas 3, elongate, persistent, coiled, the mature fruits hanging by these entangled stigmas.

1. *Streptogyne crinita* Beauv. Ess. Agrost. 80. pl. 16. f. 8. 1812.

An erect perennial, 1 to 1.5 meters tall, with elongate leaves mostly aggregated at the base and reaching beyond the base of the inflorescence, the blades 1 to 1.5 cm. wide, and a slender spike 30 to 50 cm. long, the axis rather firm, the short-pediceled slender spikelets appressed, about 3 cm. long, excluding the slender awns and curled stigmas.

Rich woods, Veracruz and Trinidad (Tabaquite, Caparo Forest) to Brazil. "Carolina," the locality given with the original description, is an error. Beauvois also mentions Guiana.

97. UNIOLA L.

Spikelets strongly compressed, few to many-flowered, the lower 1 to 4 florets empty; glumes and lemmas keeled, firm, the glumes small, the lemmas faintly many-nerved; paleas rigid, the keels broadly winged.

Spikelets 8 to 10 mm. broad, in a drooping panicle-----1. *U. paniculata*.

Spikelets less than 2 mm. wide, closely aggregated in numerous spikes, forming a long narrow erect inflorescence-----2. *U. virgata*.

1. *Uniola paniculata* L. Sp. Pl. 71. 1753.

SEASIDE OATS.

A robust tufted smooth perennial, often 2 meters tall, with long, tough, involute blades and long panicles of pale heavy spikelets, commonly 2.5 cm. long.

Sandy seacoasts, Virginia to South America. Originally described from "Carolina." In Cuba called "arana."

Bahamas (New Providence, Andros, Inagua) and Cuba.

2. *Uniola virgata* (Poir.) Griseb. Fl. Brit. W. Ind. 531. 1864.

Poa virgata Poir. in Lam. Encycl. 5: 78. 1804.

Uniola racemiflora Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2¹: 55. 1836.

Uniola sparta Trin. Linnaea 10: 307. 1836.

Eleusine procera Spreng.; Steud. Nom. Bot. ed. 2. 1: 549. 1840, as synonym of *Uniola racemiflora*.

Plants in large clumps with many sterile shoots, the culms less robust than in *U. paniculata*, 1 to 2 meters tall, the closely involute blades hard and very flexuous, the panicle stiffly erect, 40 to 60 cm. long, the slender stiff branches narrowly ascending.

Rocky seacoast, West Indies. Originally described from Santo Domingo. *Uniola racemiflora* was also described from Santo Domingo; *U. sparta* was described from Cuba.

Bahamas (New Providence, Eleuthera), Cuba (Punta Brava, *Rugel* 870), Jamaica (south coast), Haiti, Santo Domingo, Porto Rico (south coast and the island of Vieques), and St. Jan.

98. DISTICHLIS Raf.

Plants dioecious; spikelets compressed, several-flowered, the glumes and lemmas firm, keeled, the lemmas faintly many-nerved.

1. *Distichlis spicata* (L.) Greene, Bull. Calif. Acad. 2: 415. 1887. SALT GRASS.
Uniola spicata L. Sp. Pl. 71. 1753.

Distichlis maritima Raf. Journ. de Phys. 89: 104. 1819.

A low erect smooth perennial, with long running rhizomes, slender culms, spreading firm involute blades, and small compact panicles, the spikelets about 1 cm. long. Extensive colonies of sterile plants may be recognized by the overlapping sheaths and conspicuously closely distichous stiff blades.

Salt marshes and alkaline meadows, United States, Mexico, and northern West Indies. Originally described from the Atlantic coast of North America. *Distichlis maritima* was based on *Uniola spicata*, though the specific name appears to have been taken from *Uniola maritima* Michx., which Rafinesque cites as a synonym. The latter is the same as *Uniola paniculata* L.

Bahamas (New Providence, Watlings Island, Inagua) and Cuba.

99. BRIZA L.

Spikelets several to many-flowered, the florets crowded, almost horizontal; glumes and lemmas broad, subchartaceous, the margins scarious; palea much smaller than its lemma.

Spikelets few, 1 cm. wide-----1. *B. maxima*.
Spikelets numerous, 0.5 cm. wide-----2. *B. minor*.

1. *Briza maxima* L. Sp. Pl. 70. 1753.

Slender annuals 30 to 60 cm. tall with flat roughish blades and few-flowered panicles, the large handsome spikelets nodding on long capillary pedicels.

Open ground and grass land, introduced occasionally in America. Originally described from Europe. Found in the Blue Mountains of Jamaica, especially around Cinchona.

2. *Briza minor* L. Sp. Pl. 70. 1753.

A weak-stemmed annual 30 to 50 cm. tall with thin flat scabrous blades and loosely flowered panicles, the branchlets subcapillary but stiffly spreading, the spikelets triangular-ovate, nodding.

Open ground, sparingly introduced in America from Europe, whence originally described. Found in the Blue Mountains of Jamaica.

100. DACTYLIS L.

Spikelets 2 to 5-flowered, strongly compressed, sessile in dense fascicles, these paniculate; glumes and lemmas keeled, mucronate, or the lemma awn-tipped.

1. *Dactylis glomerata* L. Sp. Pl. 71. 1753.

ORCHARD GRASS.

A rather coarse roughish perennial commonly about 1 meter tall, with flat blades and panicles of few to several branches naked at base, bearing toward the ends clusters of densely crowded, sparsely pilose spikelets, these 0.8 to 1 cm. long.

Commonly cultivated in the United States as a meadow grass and frequent as an escape. Found in Jamaica (*Hart* 744, the locality unknown).

101. POA L.

Spikelets small, few-flowered; glumes keeled, acute; lemmas herbaceous with scarious tips, keeled, 5-nerved, awnless.

Plants annual-----1. *P. annua*.

Plants perennial, producing rhizomes-----2. *P. compressa*.

1. *Poa annua* L. Sp. Pl. 68. 1753.

ANNUAL BLUEGRASS.

Poa infirma H. B. K. Nov. Gen. & Sp. 1: 158. 1816.

A low tufted soft smooth annual, the culms decumbent at base, the pale open panicles commonly about 5 cm. long.

Open ground and grass land throughout the temperate regions of North America and extending southward in the mountains; introduced from Europe, whence originally described. *Poa infirma* was described from Colombia.

Bermuda, Cuba (Habana), and in the Blue Mountains of Jamaica.

2. *Poa compressa* L. Sp. Pl. 69. 1753.

CANADA BLUEGRASS.

A wiry perennial with extensively creeping slender rhizomes, slender flat culms, and narrow, rather densely flowered panicles.

Open ground and grass land; throughout the United States, probably introduced from Europe. Originally described from Europe and North America. Found introduced at high altitudes in Jamaica (near summit of Blue Mountain Peak, *Hitchcock* 9371) and Haiti (Morne Franchant, alt. 1,900 meters, *Picarda* 1019).

102. FESTUCA L.

Spikelets few to several-flowered; glumes small; lemmas firm, convex or keeled toward the summit only, awned from the tip.

First glume more than half as long as the second-----1. *F. bromoides*.

First glume less than half as long as the second-----2. *F. myurus*.

1. *Festuca bromoides* L. Sp. Pl. 75. 1753.

A slender tufted annual 30 to 50 cm. tall, with narrow blades and narrow, nearly simple panicles of short-pediceled slender-awned 4 to 6-flowered spikelets.

Open and waste places, introduced in the United States, especially on the Pacific coast. Originally described from Europe. Found in the Blue Mountains of Jamaica.

2. *Festuca myurus* L. Sp. Pl. 74. 1753.

Similar to the preceding, the culms weaker, the panicle longer and narrower, the spikelets 2 or 3-flowered, the awns more delicate.

Waste places and open ground, introduced in America. Originally described from Europe. Found in the Blue Mountains of Jamaica.

FESTUCA ELATIOR L. Sp. Pl. 75. 1753. MEADOW FESCUE. An erect perennial with awnless spikelets, frequently cultivated in the United States as a meadow grass; represented from Jamaica by a specimen without locality (*Hart* 743).

103. **SCLEROPOA** Griseb.

Spikelets small, loosely many-flowered; glumes and lemmas firm with scarious tips.

1. *Scleropoa rigida* (L.) Griseb. Spic. Fl. Rum. 2: 431. 1844.

Poa rigida L. Amoen. Acad. 4: 265. 1759.

A low-spreading glabrous annual, usually not over 10 or 15 cm. tall, with soft linear blades and stiff spikelike few-flowered panicles.

Sparingly introduced in the United States. Frequent in Bermuda. Originally described from Europe.

104. **BROMUS** L.

Spikelets several to many-flowered; glumes unequal, shorter than the florets; lemmas convex or keeled, 5 to 9-nerved, awnless or awned from between two minute teeth.

Awn of lemma longer than the body-----1. *B. sterilis*.
Awn of lemma short or none-----2. *B. unioloides*.

1. *Bromus sterilis* L. Sp. Pl. 77. 1753.

A weedy pubescent slender annual, about 50 cm. tall, with a nodding panicle of long-awned spikelets, the scabrous awns commonly 5 cm. long.

Waste places, sparingly introduced in America. Originally described from Europe. Found in the Blue Mountains of Jamaica.

2. *Bromus unioloides* H. B. K. Nov. Gen. & Sp. 1: 151. 1816. RESCUE GRASS.

Annual, commonly 1 meter tall, with velvety sheaths and large open drooping panicles, the strongly flattened spikelets 2.5 to 3.5 cm. long.

Cultivated in the southern United States and occasional as an escape. Originally described from Ecuador. Introduced in Jamaica (Hope Grounds and Cinchona).

105. **LOLIUM** L.

An Old World genus with several-flowered spikelets, sessile on opposite sides of the slender axis, the glume next the axis wanting, represented by one specimen from Jamaica (*Hart* 739, without locality) of *L. multiflorum* Lam., with awned florets exceeding the glume, and by two from Cuba (*León* 1583, Calvario, and *León* 5052, Vibora-Habana) of *L. temulentum arvense* (With.) Bab., with awnless florets exceeded by the glume.

106. **HORDEUM** L.

Spikelets 1-flowered, in clusters of 3 at each joint of an articulate rachis, the middle spikelet sessile, perfect, the lateral spikelets stipitate, reduced to the awnlike glumes; glumes and lemmas awned.

1. *Hordeum pusillum* Nutt. Gen. Pl. 1: 87. 1818.

A low, usually branched annual with cylindrical spikes 3 to 8 cm. long, a part of the glumes dilated above the base.

Open dry ground, western United States, but introduced eastward. Originally described from the Missouri Valley. Found in Bermuda.

PARIANA SYLVESTRIS Nees (Agrost. Bras. 295. 1829), a Brazilian species, is mentioned by Grisebach¹ as having been found in St. Vincent by Guilding, "perhaps introduced."

¹ Fl. Brit. W. Ind. 528. 1864.

107. *ARTHROSTYLIDIUM* Rupr.¹

Spikelets few-flowered, in racemes, the lower 1 or 2 lemmas empty, the rachilla articulate between the florets (rarely below the glumes). In Cuba the species are called "tibisi" as are those of *Lasiacis*.²

Blades subcapillary, 1 to 3 mm. wide, as much as 30 cm. long, drying involute.

1. *A. capillifolium*.

Blades not subcapillary, flat.

Tips of culms and branches retrorse-scabrous.

Blades about 6 mm. wide-----8. *A. haitiense*.

Blades 10 to 12 mm. wide-----9. *A. multispicatum*.

Tips of culms and branches not retrorse-scabrous.

Blades not over 5 cm. long, usually shorter (rarely 6 cm. long in young shoots).

Sheaths not bristly; inflorescence racemose----2. *A. sarmentosum*.

Sheaths conspicuously squarrose-bristly at the summit; inflorescence elongate, consisting of distant groups of spikelets.

3. *A. distichum*.

Blades or some of them at least 8 cm. long; inflorescence racemose.

Sheaths not bristly at the summit, or with but one or two weak bristles.

Blades pubescent beneath, thick, rigid, the midnerve and margins prominent-----6. *A. urbanii*.

Blades glabrous.

Spikelets crowded, terminating the densely whorled leafy branches; blades acuminate-----5. *A. prestoei*.

Spikelets not crowded, borne on solitary or fascicled axillary branchlets; blades obtuse at tip.

13. *A. obtusatum*.

Sheaths bristly at the summit.

Bristles 1 to 2 cm. long, some of them squarrose or reflexed, not curled and tangled at the tips-----4. *A. fimbriatum*.

Bristles less than 5 mm. long, erect, the tips curled and tangled.

Blades pubescent beneath-----7. *A. pubescens*.

Blades glabrous.

Spikelets divergent on a zigzag axis, the flowering branches axillary-----10. *A. excelsum*.

Spikelets erect or appressed, the axis not zigzag.

Inflorescence of slender racemes, leafless or nearly so-----11. *A. cubense*.

Inflorescence of narrow panicles, terminating leafy branches-----12. *A. angustifolium*.

1. *Arthrostylidium capillifolium* Griseb. Mem. Amer. Acad. n. ser. 8: 531. 1862.
Arundinaria capillifolia Hack. Oesterr. Bot. Zeitschr. 53: 69. 1903.

¹In the tribe Bamboseae the genera are here accepted as distinguished by Hackel (Engl. & Prantl, Pflanzenfam. 2²: 1887). Further field study and collections of flowering plants are necessary before the true generic characters of this tribe can be understood.

²In this and other genera of bamboos the description of habit is necessarily omitted in those species not observed by the authors and not adequately described from living plants.

Climbing to a height of 15 meters or more, repeatedly branching, swinging down from the trees in great curtains, or festooning lower growth, the linear or filiform blades crowded on short sterile branchlets, these arranged in dense whorls like great pompons at the distant nodes; inflorescence of numerous slender wiry, not zigzag racemes borne in the whorls of branchlets, the appressed rather distant spikelets about 1 cm. long.

Dryish thickets and wooded slopes, northern West Indies. Originally described from eastern Cuba, the type being *Wright* 738.

Bahamas (Andros, Great Exuma, New Providence), Cuba, Porto Rico (Maricao, Sabana Grande, and on the island of Vieques), and St. Thomas.

2. *Arthrostylidium sarmentosum* Pilger in Urban, Symb. Antill. 4: 108. 1903.

Culms apparently herbaceous, not over 3 mm. thick, high-climbing and pendent from trees as in the preceding; branchlets commonly 10 to 15 cm. long, leafy, in distant usually dense whorls, the foliage pale green, drying glaucous, the divergent blades 3.5 to 5 cm. long, 3 to 5 mm. wide, rather thin; inflorescence of numerous short-exserted terminal and axillary zigzag racemes of 2 to 5 narrow pubescent spikelets.

Along streams and trails; wet mountain forests, at higher altitudes, Province of Oriente, Cuba (Monte Verde, Yateras), and Porto Rico. Originally described from sterile specimens from Porto Rico, *Heller* 1089, Sierra de Luquillo, and *Sintenis* 354, 4046. Collected in flower only once¹ (*Chase* 6730, Amer. Gr. Nat. Herb. 399²) on the north slope of El Yunque, Porto Rico.

3. *Arthrostylidium distichum* Pilger in Urban, Symb. Antill. 2: 342. 1901.

Branches solitary or in small fascicles, the approximate lanceolate-acuminate spreading blades about 2.5 cm. long.

Only known from the type collection, *Wright* 3808 from Rangel, Pinar del Río, Cuba.

4. *Arthrostylidium fimbriatum* Griseb. Mem. Amer. Acad. n. ser. 8: 531. 1862.

Branches solitary(?), appressed; blades commonly reflexed, rather rigid, narrowly cuneate; racemes terminating nearly leafless branches, the axis straight, the spikelets appressed. Originally described as 1 to 3 feet tall, but probably several meters tall.

Dense mountain woods, eastern Cuba (*Wright* 1554, the type specimen, and Loma Mensura, *Shafer* 3771).

5. *Arthrostylidium prestoei* Munro, Kew Bull. Misc. Inf. 1895: 186. 1895; Pilger in Urban, Symb. Antill. 2: 338. 1901.

Culms rather robust, bearing at the distant nodes dense whorls of slender branches about 30 cm. long, these bearing 1 or 2 rather thin elongate-lanceolate blades toward their summits and terminating in a densely flowered, mostly one-sided raceme.

Trinidad and Colombia. Described from specimens collected by Prestoe in Trinidad (*Trin. Bot. Gard. Herb.* 1675) and from plants cultivated at Kew. Found also in Caparo Forest (*Broadway* 4922).

6. *Arthrostylidium urbanii* Pilger in Urban, Symb. Antill. 2: 339. 1901.

Arundinaria urbanii Hack Oesterr. Bot. Zeitschr. 53: 69. 1903.

Rather robust, bearing stiff wiry branches in whorls at the distant nodes, the rather rigid sublinear blades often reflexed, readily falling from the crowded overlapping sheaths; branches terminating in slender racemes, the spikelets appressed to the straight axis.

¹ Chase, Bot. Gaz. 58: 277-279. pl. 21. 1914.

² See footnote, p. 405.

Known only from the type collection, *Wright* 3810 from Cuba, the particular locality unknown, and from *León* 4446, collected at San Diego de los Baños, Cuba.

7. *Arthrostylidium pubescens* Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 3¹: 119. 1839.

Arundinaria pubescens Hack. Oesterr. Bot. Zeitschr. 53: 69. 1903.

Culm slender, roughish, the leafy sterile branches 8 to 10 cm. long, rather rigid, divergent, in remote fascicles, the rough leaves 8 to 15 cm. long, 6 to 10 mm. wide; racemes in dense fascicles, the spikelets appressed to the stiff axis.

Mountain tops, Trinidad, whence originally described, and Venezuela.

8. *Arthrostylidium haitiense* (Pilger).

Arundinaria haitiensis Pilger in Urban, Symb. Antill. 5: 288. 1907.

Described as climbing 2 to 3 meters high, the young internodes scabrous; branches numerous, about 20 cm. long, in distant fascicles; blades 5 to 7 cm. long, about 6 mm. wide, with a petiole about 2 mm. long; spikelets narrow, closely appressed to the axis, few in short racemes terminating the branches.

Shady ravines, Haiti. Known only from the type collection, *Buch* 929, Monte Furcy, near Port au Prince.

9. *Arthrostylidium multispicatum* Pilger in Urban, Symb. Antill. 2: 341. 1901.

Arundinaria multispicata Hack. Oesterr. Bot. Zeitschr. 53: 69. 1903.

Climbing high, the slender growing ends of the culms and branches beset with very short retrorse prickles, these ends, often 4 meters long, swinging in the breeze like whip lashes until a support is found, the radiating short sharp scale-covered branch buds then developing, these long grappling branches freely produced, forming a dense tangled mass; prickles deciduous, the old culms smooth; sterile branchlets whorled, 15 to 30 cm. long, the spreading blades 6 to 8 cm. long, 10 to 12 mm. wide (on vigorous shoots sometimes larger), the floriferous branches rather shorter, bearing 1 to 3 leaves and slender terminal and axillary racemes, the spikelets appressed to the straight axis.

Wooded mountain slopes, Cuba (Yayabo River, Santa Clara, and Santiago) and Porto Rico (Maricao, Adjuntas, Jayuya). Originally described from Porto Rico, two specimens being mentioned, *Sintenis* 209 from Maricao and *Sintenis* 4016 [4106?] from Adjuntas.

10. *Arthrostylidium excelsum* Griseb. Fl. Brit. W. Ind. 529. 1864.

Arundinaria excelsa Hack. Oesterr. Bot. Zeitschr. 53: 69. 1903.

High-climbing; branchlets whorled, 20 to 50 cm. long, the blades commonly 8 to 12 cm. long, 12 to 15 mm. wide; racemes terminal and axillary, the axis strongly zigzag, the spikelets divergent.

Hills, Dominica, Guadeloupe, Trinidad (whence originally described), and Tobago.

11. *Arthrostylidium cubense* Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 3¹: 118. pl. 4. f. 13. 1839.

Arundinaria cubensis Hack. Oesterr. Bot. Zeitschr. 53: 69. 1903.

Culms slender; blades of primary branches 10 to 15 cm. long, 8 to 10 mm. wide, those of the ultimate flowering branchlets elongate, linear, 3 to 4 mm. wide; flowering branches very slender, 20 to 30 cm. long, naked or with one or two narrow blades at base, bearing a few distant appressed spikelets toward their ends.

Pendent on cliffs, central and western Cuba, the type specimen collected by Sagra.

12. *Arthrostylidium angustifolium* Nash, *Torreyia* 3: 172. 1903.

Culms 2 to 3 meters long, freely branching, clambering over shrubs; ultimate branches leafy, with short overlapping compressed sheaths and erect blades 3 to 4 mm. wide and as much as 25 cm. long, the branches terminating in strict panicles, the slender branchlets erect, the linear spikelets 2 to 3 cm. long.

Wooded mountain slope, El Yunque, Baracoa, Cuba. Known only from the type collection, *Underwood & Earle* 941.

13. *Arthrostylidium obtusatum* Pilger in Urban, *Symb. Antill.* 2: 340. 1901.

Arundinaria obtusata Hack. *Oesterr. Bot. Zeitschr.* 53: 69. 1903.

Inflorescence racemose, terminating fascicled leafy branches and borne in the axils; blades rather rigid, about 8 cm. long and 12 mm. wide; tapering from base to apex, the tip obtuse.

Known only from the original collections from the summit of Morne d'Amour, Martinique (*Duss* 563, 1310).

108. *CHUSQUEA* Kunth.

Spikelets small, with 1 perfect floret and 2 empty lemmas below it, the rachilla articulate below the glumes, the spikelets in small terminal panicles; blades disarticulating from the persistent sheaths.

1. *Chusquea abietifolia* Griseb. *Fl. Brit. W. Ind.* 529. 1864.

Arundinaria? microclada Pilger in Urban, *Symb. Antill.* 5: 289. 1907.

Crawling and climbing to a height of 7 meters or more, the slender culms festooning and forming an entanglement across mountain trails; branchlets about 10 cm. long, in whorls, the numerous rigid, spine-tipped, scabrous-margined blades 2 to 3 cm. long, drying glaucous; flowering branches leafy at base, terminating in a small few-flowered, nearly simple panicle, the spikelets short-pedicelled; very rarely flowering.

Wet woods, Blue Mountains, Jamaica, Porto Rico (Monte Alegrillo), and Haiti (Monte Furcy). Originally described from Jamaica, common in the Blue Mountains above 1,000 meters. The specimens from Cold Spring Gap collected by Harris (*Amer. Gr. Nat. Herb.* 400¹) and by Hitchcock (no. 9734) are fertile; the others are sterile. *Arundinaria microclada* was described from sterile specimens collected at 1,500 meters altitude, in open woods on Monte Furcy, Haiti (*Picarda* 270, *Buch* 930). The *Picarda* specimen in the Krug & Urban Herbarium is about a meter long, apparently the pendent end of a culm, the short branchlets and small blades (12 to 15 mm. long) suggesting a dry situation. The sheaths are minutely pubescent as in the Porto Rico specimens; in Jamaica specimens the sheaths are pubescent on the margin only.

109. *PLANOTIA* Munro.

Spikelets as in *Chusquea*, crowded in a long dense panicle; culm herbaceous.

1. *Planotia virgata* (Griseb.) Munro, *Trans. Linn. Soc.* 26: 71. 1868.

Platonia virgata Griseb. *Fl. Brit. W. Ind.* 530. 1864.

Culms herbaceous, tall, robust, leafy below, the thickish blades commonly more than 1 meter long, about 5 cm. wide, long-attenuate, the margins serrulate; panicle much exceeding the leaves, about 75 cm. long and 2 cm. thick, compact, tawny, the small spikelets densely crowded.

Dense forests, mountains of Trinidad, the type collected at Tocuche by Crueger.

¹ See footnote, p. 405.

110. **BAMBOS** Retz.

Spikelets several to many-flowered, the glumes and sterile lemmas persistent after the fall of the florets; glumes small; lemmas firm, sharp-pointed or awn-tipped, sessile, solitary or in clusters on an elongate axis or the branches of a panicle; stamens 6.

Spikelets 3 to 6 cm. long-----1. *B. latifolia*.
Spikelets 1 to 2 cm. long-----2. *B. vulgaris*.

1. *Bambos latifolia* Humb. & Bonpl. Pl. Aequin. 1: 68. pl. 21. 1808.

Guadua latifolia Kunth, Syn. Pl. Aequin. 1: 254. 1822.

Arborescent, as much as 8 meters tall, the summit nodding; spikelets cylindric, more or less falcate.

Damp forests, Trinidad and northern South America. Originally described from Venezuela.

2. *Bambos vulgaris* Schrad.; Wendl. Coll. Pl. 2: 26. pl. 47. 1810.

COMMON BAMBOO.

Bambusa sieberi Griseb. Fl. Brit. W. Ind. 528. 1864.

Arborescent, as much as 10 meters tall, freely branching; flowering branches fascicled, elongate, leafless, the sessile spikelets radiate in clusters.

Cultivated in the Tropics of both hemispheres, the native country doubtful but not American. *Bambusa sieberi* was described from Martinique. Common in the West Indies as an escape from cultivation. Called in Cuba "caña brava."

BAMBOS NANA Roxb. (Fl. Ind. 2: 199. 1832), 2 to 3 meters tall, has spread from cultivation at Cinchona, Jamaica.

DOUBTFUL SPECIES.

In the following list are given the names of species described from the West Indies, for which we have not been able to account:

Aira gigantea Steud. Syn. Pl. Glum. 1: 224. 1854. Described from a specimen in the herbarium of Mougéot, said to be very likely from the Antilles.

Anatherum berterianum Spreng.; Schult. Mant. 2: 443. 1824. "In Portorico et Guadeloupe." Has been referred to *Imperata*, but the description does not well apply.

Anatherum pedunculatum Desv. Opusc. 70. 1831. "Antillis." Possibly *Andropogon condensatus*.

Avena lutea L. f. Suppl. Pl. 112. 1781. *Trisetum luteum* Pers. Syn. Pl. 1: 97. 1805. "Martinique." The description does not apply to any species known from the West Indies.

Cenchrus hirsutus Spreng. Neu. Entd. 3: 15. 1822. "Hispaniola." The description does not agree with any species known to us from the West Indies.

Cenchrus parviflorus Poir. in Lam. Encycl. 6: 52. 1804. Described from Porto Rico. Probably *Chaetochloa geniculata*, but the description does not well apply.

Chaetochloa corrugata parviflora Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 24. 1900. Based on *Cenchrus parviflorus* Poir. The species to which this name is applied is *Chaetochloa geniculata*.

Chondrachyum scabrum Nees; Steud. Syn. Pl. Glum. 1: 288. 1854. Described from "Ind. Occ." but the locality possibly erroneous. The description suggests Melica, which is not known from the West Indies.

Digitaria (?) *domingensis* Roem. & Schult. Syst. Veg. 2: 475. 1817, based on *Panicum domingense* Zuccagni.

Digitaria repens Kunth, Enum. Pl. 1: 84. 1833, as synonym of *Panicum domingense* Zuccagni.

Echinochloa cubensis Schult. Mant. 2: 596. 1824. Probably *Oplismenus hirtellus*. We have not been able to verify this citation.

Festuca thouini Steud. Syn. Pl. Glum. 1: 311. 1854. Possibly *Arundo donax* or *Phragmites* or a cultivated species of *Cortaderia*.

Holcus cubanicus Gleditsch; Schult. Mant. 2: 462. 1824, nomen nudum.

Panicum confertum Desv.; Poir. in Lam. Encycl. Suppl. 4: 279. 1816. "Antilles." Possibly *Isachne arundinacea*.

Panicum domingense Zuccagni in Roemer, Coll. Bot. 123. 1809. "St. Domingo." Possibly *Syntherisma villosa*.

Panicum ocreatum Willd.; Spreng. Syst. Veg. 1: 305. 1825, as synonym of *Setaria ocreata*.

Panicum rohrii Nees; Steud. Syn. Pl. Glum. 1: 76. 1854. "Ind. occ." The description does not apply to any species we know from the West Indies.

Paspalum guadaloupense Steud. Syn. Pl. Glum. 1: 18. 1854. "Guadaloupe." The description points to *Axonopus compressus*, but Grisebach¹ refers it to *Paspalum conjugatum* var. *subcordatum* Griseb., of which it is the basis.

Paspalum koleopodium Steud. Syn. Pl. Glum. 1: 18. 1854. "Guadaloupe." Grisebach refers this to *P. caespitosum*, but the description does not well agree with that species.

Paspalum lagascae Roem. & Schult. Syst. Veg. 2: 317. 1817. Based on *P. pubescens* Lag.

Paspalum molle Poir. in Lam. Encycl. 5: 34. 1804. "St. Thomas."

Paspalum panicum Smith in Rees's Cycl. 26: no. 14. 1813. "Jamaica." The description suggests *P. densum*.

Paspalum pubescens Lag. Gen. & Sp. Nov. 2. 1816, not Willd. 1809. Described from a specimen grown in Habana from seed sent by Sessé, probably from Mexico.

Paspalum rhizomatosum Steud. Syn. Pl. Glum. 1: 17. 1854. "Guadaloupe." A species with a decumbent base rooting at the nodes. Nash² refers it to *P. orbiculatum*, but the description does not well agree with that species nor does it agree with *P. reptatum*. The species may be *P. nutans*.

Paspalum sinuosum Desv. Opusc. 57. 1831. "Antillis." Nash³ refers this to *P. glabrum*.

Paspalum strictum Pers. Syn. Pl. 1: 86. 1805. "Insul. Antill. et ad St. Domingo." Nash⁴ refers this to *P. paniculatum*.

Piptatherum setosum A. Rich. in Sagra, Hist. Cuba 11: 311. 1850. Referred by Grisebach⁵ to *Andropogon setosus* (*Sorghastrum parviflorum*). The description does not well apply to the latter species.

Reimaria diffusa Spreng. Neu. Entd. 3: 14. 1822. "Martinica." Unidentifiable, description probably erroneous.

Setaria ocreata Spreng. Syst. Veg. 1: 305. 1825. The description points to *Oplismenus hirtellus*.

Sorghum cubanicus Schult. Mant. 2: 519. 1824.

Vilfa intermedia Trin. Gram. Unifl. 156. 1824. "Ind. occ." In a later work the locality is given as "Mauritan." Probably not from the West Indies.

¹ Abh. Ges. Wiss. Göttingen 7: 262. 1857.

² N. Amer. Fl. 17: 194. 1912.

³ Op. cit. 17: 187. 1912.

⁴ Op. cit. 17: 189. 1912.

⁵ Cat. Pl. Cub. 235. 1866.

LIST OF NEW GENERA AND SPECIES AND NEW NAMES.

	Page.
Anatherum zizanioides (L.) Hitchc. & Chase_____	285
<i>Phalaris zizanioides</i> L.	
Andropogon multinervosus (Nash) Hitchc. & Chase_____	280
<i>Schizachyrium multinervosum</i> Nash.	
Arthrostylidium haitiense (Pilger) Hitchc. & Chase_____	399
<i>Arundinaria haitiensis</i> Pilger.	
Arundinella berteroniana (Schult.) Hitchc. & Chase_____	290
<i>Trichochloa berteroniana</i> Schult.	
Arundinella confinis (Schult.) Hitchc. & Chase_____	290
<i>Piptatherum confine</i> Schult.	
Axonopus appendiculatus (Presl) Hitchc. & Chase_____	300
<i>Paspalum appendiculatum</i> Presl.	
Axonopus equitans Hitchc. & Chase, sp. nov_____	301
Axonopus macrostachyus Hitchc. & Chase, sp. nov_____	301
Axonopus pellitus (Nees) Hitchc. & Chase_____	301
<i>Paspalum pellitum</i> Nees.	
Cenchrus microcephalus Nash, sp. nov_____	356
Chaetochloa barbata (Lam.) Hitchc. & Chase_____	348
<i>Panicum barbatum</i> Lam.	
Chaetochloa impressa (Nees) Hitchc. & Chase_____	350
<i>Panicum impressum</i> Nees.	
Chaetochloa palmifolia (Willd.) Hitchc. & Chase_____	348
<i>Panicum palmifolium</i> Willd.	
Chaetochloa rariflora (Mikan) Hitchc. & Chase_____	349
<i>Setaria rariflora</i> Mikan.	
Chaetochloa tenacissima (Schrad.) Hitchc. & Chase_____	352
<i>Setaria tenacissima</i> Schrad.	
Chaetochloa vulpiseta (Lam.) Hitchc. & Chase_____	350
<i>Panicum vulpisetum</i> Lam.	
Echinochloa pyramidalis (Lam.) Hitchc. & Chase_____	345
<i>Panicum pyramidale</i> Lam.	
Eragrostis leonina Hitchc. & Chase, sp. nov_____	388
Ichnanthus axillaris (Nees) Hitchc. & Chase_____	334
<i>Panicum axillare</i> Nees.	
Ichnanthus ichnodes (Griseb.) Hitchc. & Chase_____	335
<i>Panicum ichnodes</i> Griseb.	
Ichnanthus nemoralis (Schrad.) Hitchc. & Chase_____	334
<i>Panicum nemorale</i> Schrad.	
Ichnanthus tenuis (Presl) Hitchc. & Chase_____	334
<i>Oplismenus tenuis</i> Presl.	
Lasiacis ligulata Hitchc. & Chase, sp. nov_____	337
Lasiacis patentiflora Hitchc. & Chase, sp. nov_____	338
Lasiacis ruscifolia (H. B. K.) Hitchc. & Chase_____	339
<i>Panicum ruscifolium</i> H. B. K.	
Lasiacis sorghoidea (Desv.) Hitchc. & Chase_____	338
<i>Panicum sorghoideum</i> Desv.	

Leptochloa uninervia (Presl) Hitchc. & Chase-----	383
<i>Megastachya uninervia</i> Presl.	
Manisuris aurita (Steud.) Hitchc. & Chase-----	276
<i>Rottboellia aurita</i> Steud.	
Manisuris leonina Hitchc. & Chase, sp. nov-----	275
Paspalum olivaceum Hitchc. & Chase, sp. nov-----	310
Paspalum reptatum Hitchc. & Chase, sp. nov-----	318
Paspalum secans Hitchc. & Chase, sp. nov-----	319
Paspalum serratum Hitchc. & Chase, sp. nov-----	306
Paspalum wrightii Hitchc. & Chase, sp. nov-----	310
Raddia biformis Hitchc. & Chase, sp. nov-----	358
Raddia urbaniana Hitchc. & Chase, sp. nov-----	359
Saugetia Hitchc. & Chase, gen. nov-----	378
Saugetia fasciculata Hitchc. & Chase, sp. nov-----	378
Senites haitiensis (Pilger) Hitchc. & Chase-----	392
<i>Zeugites americana</i> subsp. <i>haitiensis</i> Pilger.	
Sorghastrum parviflorum (Desv.) Hitchc. & Chase-----	287
<i>Sorghum parviflorum</i> Desv.	
Sporobolus berteroanus (Trin.) Hitchc. & Chase-----	370
<i>Vilfa berteroana</i> Trin.	
Sporobolus muralis (Raddi) Hitchc. & Chase-----	368
<i>Agrosticula muralis</i> Raddl.	
Syntherisma argillacea Hitchc. & Chase, sp. nov-----	296
Syntherisma argyrostachya (Steud.) Hitchc. & Chase-----	294
<i>Panicum argyrostachyum</i> Steud.	
Syntherisma curvinervis (Hack.) Hitchc. & Chase-----	295
<i>Panicum curvinerve</i> Hack.	
Thrasya robusta Hitchc. & Chase, sp. nov-----	297
Valota eggersii (Hack.) Hitchc. & Chase-----	292
<i>Panicum eggersii</i> Hack.	
Valota laxa (Reichenb.) Hitchc. & Chase-----	292
<i>Reimaria laxa</i> Reichenb.	

CATALOGUE OF SPECIMENS IN THE UNITED STATES NATIONAL HERBARIUM, ARRANGED BY COLLECTORS' NAMES AND NUMBERS.¹

AMER. GR. NAT. HERB.²

19. *Panicum elephantipes*.
46. *Panicum stenodes*.
47. *Panicum condensum*.
59. *Panicum pilosum*.
72. *Panicum parvifolium*.
89. *Panicum chrysopsidifolium*.
133. *Panicum acuminatum*.
201. *Panicum utowanaeum*.
202. *Panicum geminatum*.
203. *Panicum reptans*.
205. *Panicum diffusum*.
208. *Panicum laxum*.
210. *Panicum parvifolium*.
211. *Panicum glutinosum*.
232. *Imperata brasiliensis*.
238. *Manisuris exaltata*.
247. *Andropogon bicornis*.
249. *Andropogon brevifolius*.
257. *Andropogon gracilis*.
260. *Andropogon hirtiflorus*.
265. *Andropogon pertusus*.
267. *Andropogon saccharoides*.
275. *Andropogon virginicus*.
287. *Leptothrium rigidum*.
289. *Arundinella confinis*.
293. *Valota insularis*.
300. *Eriochloa punctata*.
301. *Eriochloa punctata*.
302. *Eriochloa subglabra*.
303. *Sacciolepis myuros*.
304. *Hymenachne amplexicaulis*.
312. *Pharus latifolius*.
313. *Pharus parvifolius*.
380. *Bouteloua americana*.
399. *Arthrostyldium sarmentosum*.
400. *Chusquea abietifolia*.

BAKER, C. F.

2. *Paspalum notatum*.
32. *Panicum maximum*.
33. *Paspalum plicatulum*.
34. *Paspalum plicatulum*.
89. *Anatherum zizanioides*.
90. *Paspalum conjugatum*.
501. *Syntherisma sanguinalis*.
502. *Echinochloa colonum*.
1183. *Chloris virgata*.
1441. *Chloris paraguayensis*.
1799. *Sporobolus argutus*.
1810. *Sporobolus virginicus*.
1818. *Sporobolus argutus*.
1824. *Paspalum bakeri*.
1929. *Trachypogon gouini*.
2056. *Paspalum plicatulum*.
2078. *Panicum parvifolium*.
2501. *Lasiacis divaricata*.
3459. *Paspalum neesii*.
3635. *Leptochloa virgata*.
3817. *Lasiacis grisebachii*.
4023. *Chloris virgata*.
4334. *Panicum zizanioides*.
4555. *Leptocoryphium lanatum*.
4587. *Lasiacis sloanei*.
4765. *Echinochloa colonum*.
5239. *Olyra latifolia*.
5332. *Eragrostis elliottii*.
7208. *Aristida curtifolia*.

BAKER, C. F., AND ABARCA.

3447. *Achlaena piptostachya*.
3461. *Oplismenus hirtellus*.
3735. *Eragrostis elliottii*.
4181. *Manisuris loricata*.
4185. *Paspalum multicaule*.
4328. *Eragrostis hypnoides*.

¹ It not infrequently occurs that two or more species have been distributed under the same number to different herbaria. Each citation in this list refers to a particular sheet in the National Herbarium.

² American grasses from the United States National Herbarium, Smithsonian Institution, distributed by the Systematic Agrostologist, United States Department of Agriculture.

BAKER, C. F., AND DIMMOCK.

4813. *Paspalum pulchellum*.
4846. *Panicum fusiforme*.

BAKER, C. F., AND HASSELBRING, H.

7208. *Aristida curtifolia*.
7211. *Aristida curtifolia*.

BAKER, C. F., AND O'DONOVAN.

4545. *Paspalum alterniflorum*.

BAKER, C. F., TRACY, S. M., AND HASSELBRING, H.

3096. *Paspalum denticulatum*.
3097. *Paspalum notatum*.

BAKER, C. F., AND VAN HERMANN.

4269. *Lasiacis grisebachii*.

BAKER, C. F., AND WILSON, P.

304. *Lasiacis divaricata*.
342. *Paspalum conjugatum*.
385. *Paspalum distichum*.
511. *Panicum diffusum*.
512. *Panicum adpersum*.
513. *Eleusine indica*.
515. *Cenchrus echinatus*.
522. *Chaetochloa geniculata*.
537. *Sporobolus indicus*.
543. *Paspalum conjugatum*.
561. *Chaetochloa geniculata*.
595. *Paspalum virgatum*.
596. *Paspalum plicatulum*.
599. *Andropogon virginicus*.
602. *Valota insularis*.
2293. *Distichlis spicata*.
2348b. *Distichlis spicata*.

BAKER, C. F., AND ZARRAGOITIA.

4063. *Chaetochloa geniculata*.

BARBADOS BOTANIC STATION HERBARIUM.¹

200. *Paspalum fimbriatum*.
233. *Eleusine indica*.

240. *Echinochloa colonum*.
263. *Dactyloctenium aegyptium*.
265. *Cymbopogon citratus*.
266. *Chloris radiata*.
268. *Leptochloa filiformis*.
269. *Paspalum conjugatum*.
270. *Eragrostis ciliaris*.
277. *Paspalum vaginatum*.
343. *Eragrostis pilosa*.
443. *Andropogon nodosus*.
448. *Brachiaria erucaeformis*.
450. *Panicum laxum*.
453. *Chaetochloa geniculata*.
455. *Paspalum virgatum*.
458. *Ichnanthus pallens*.
538. *Panicum reptans*.
568. *Colx lachryma-jobi*.
585. *Themeda quadrivalvis*.

BARRETT, O. W.

9. *Lasiacis divaricata*.
57. *Chloris radiata*.
61. *Panicum trichoides*.
62. *Eleusine indica*.
63. *Panicum fasciculatum*.
64. *Echinochloa colonum*.
72. *Andropogon bicornis*.
73. *Paspalum paniculatum*.
101. *Arundinella confinis*.

BENZON, A.

42. *Panicum capillare*.

BOLDINGH, I.

- 3512B. *Bouteloua vaneedeni*.
5379. *Panicum hirticaule*.

BRACE, L. J. K.

1525. *Stenotaphrum secundatum*.
3742. *Panicum dichotomiflorum*.
3901. *Phragmites phragmites*.
3993. *Eragrostis bahamensis*.
3994. *Eleusine indica*.
4003. *Sporobolus virginicus*.
4077. *Aristida adscensionis*.
4230. *Lasiacis divaricata*.
4242. *Eragrostis ciliaris*.
4251. *Sporobolus atrovirens*.
4305. *Lasiacis divaricata*.
4633. *Aristida adscensionis*.

¹ See specimens listed under Dash, J. S.

4805. *Paspalum portoricense*.
4812. *Panicum ghiesbreghtii*.
4882. *Syntherisma panicea*.
4951. *Andropogon glomeratus*.
5258. *Paspalum caespitosum*.

BRITTON, E. G.

6506. *Imperata brasiliensis*.

BRITTON, E. G., AND MARBLE, D.

520. *Eragrostis hypnoides*.
654. *Andropogon leucostachyus*.
678. *Lasiacis ligulata*.
1068. *Panicum laxum*.
1221. *Panicum laxum*.
1230. *Lasiacis ligulata*.
1347. *Andropogon bicornis*.

BRITTON, N. L.

122. *Eragrostis ciliaris*.
465. *Paspalum filiforme*.
1475. *Paspalum leptocaulon*.
1902. *Paspalum glabrum*.
1923. *Eragrostis prolifera*.
1930. *Chaetochloa setosa*.
1933. *Panicum reptans*.
2032. *Chloris paraguayensis*.
2035. *Sporobolus argutus*.
2105. *Chaetochloa setosa*.
2106. *Lasiacis divaricata*.
2123. *Eragrostis glutinosa*.
2124. *Cenchrus echinatus*.
2125. *Sporobolus domingensis*.
2139. *Eragrostis ciliaris*.
2148. *Bouteloua heterostega*.
2172. *Chaetochloa geniculata*.
2175. *Paspalum caespitosum*.
2176. *Leptochloa filiformis*.
2177. *Aristida adscensionis*.
2245. *Panicum reptans*.
2264. *Distichlis spicata*.
2281. *Panicum geminatum*.
2347. *Eragrostis tephrosanthos*.
2361. *Paspalum millegrana*.
2366. *Eriochloa subglabra*.
2368. *Paspalum paniculatum*.
2369. *Syntherisma sanguinalis*.
2373. *Eragrostis elliotii*.
2374. *Eragrostis leonina*.
2378. *Paspalum fimbriatum*.
2414. *Andropogon multinervosus*.

2519. *Leptochloa fascicularis*.
3193. *Panicum glutinosum*.
3200. *Oplismenus setarius*.
3375. *Isachne pygmaea*.
3401. *Leptochloa virgata*.
10022. *Sporobolus purpurascens*.
10048. *Arundinella deppeana*.

BRITTON, N. L., AND BRACE, L. J. K.

187. *Lasiacis divaricata*.
336. *Sporobolus domingensis*.
340. *Paspalum vaginatum*.
403. *Muhlenbergia capillaris*.
404. *Paspalum glabrum*.
405. *Sporobolus indicus*.
417. *Distichlis spicata*.
424. *Panicum diffusum*.
432. *Andropogon semiberbis*.
486. *Syntherisma panicea*.
504. *Leptochloa fascicularis*.
513. *Paspalum distichum*.
537. *Arthrostylidium capillifolium*.
598. *Paspalum secans*.
701. *Syntherisma panicea*.

BRITTON, N. L., BRITTON, E. G., AND
COWELL, J. F.

2103. *Paspalum paniculatum*.
2104. *Panicum fasciculatum*.
4014. *Syntherisma sanguinalis*.
4017. *Bouteloua heterostega*.
9673. *Panicum acuminatum*.
9732. *Achlaena piptostachya*.
9774. *Arthrostylidium capillifolium*.
12857. *Aristida scabra*.

BRITTON, N. L., BRITTON, E. G., EARLE,
F. S., AND GAGER, S.

6494. *Panicum parvifolium*.
6505. *Panicum acuminatum*.
6520. *Panicum cayennense*.

BRITTON, N. L., BRITTON, E. G., AND
GAGER, S.

6952. *Panicum wrightianum*.
7064. *Panicum aciculare*.
7075. *Panicum parvifolium*.
7170. *Panicum erectifolium*.
7201. *Panicum millegrana*.
7271. *Eragrostis cubensis*.
7275. *Panicum cayennense*.
7452. *Panicum boliviense*.

BRITTON, N. L., BRITTON, E. G., AND
MARBLE, D.

476. *Panicum reptans*.
1758. *Cenchrus echinatus*.
1778. *Bouteloua heterostega*.

BRITTON, N. L., BRITTON, E. G., AND
SHAFFER, J. A.

119. *Aristida cognata*.
127. *Cenchrus echinatus*.
128. *Eragrostis ciliaris*.
141. *Lasiacis sorgholdea*.

BRITTON, N. L., BRITTON, E. G., AND
WILSON, P.

5510. *Eragrostis prolifera*.
5566. *Eragrostis prolifera*.
5583. *Gynerium sagittatum*.
13945. *Achlaena piptostachya*.
13996. *Tricholaena rosea*.
14141. *Sporobolus cubensis*.
14150. *Panicum erectifolium*.
14155. *Sacciolepis myuros*.
14173. *Leptocoryphium lanatum*.
14194. *Eragrostis cubensis*.
14198. *Aristida spiciformis*.
14216. *Panicum portoricense*.
14218. *Panicum chamaelonche*.
14221. *Panicum chamaelonche*.
14224. *Panicum acuminatum*.
14226. *Panicum lancearium*.
14228. *Panicum acuminatum*.
14235. *Panicum parvifolium*.
14310. *Andropogon virgatus*.
14344. *Valota insularis*.
14357. *Panicum acuminatum*.
14392. *Panicum geminatum*.
14397. *Imperata brasiliensis*.
14399. *Imperata brasiliensis*.
14411. *Panicum polycaulon*.
14414. *Aristida curtifolia*.
14420. *Andropogon semiberbis*.
14422. *Sporobolus cubensis*.
14455. *Panicum cayennense*.
14616. *Oplismenus hirtellus*.
14621. *Panicum condensum*.
14638. *Panicum pilosum*.
14648. *Olyra latifolia*.
14659. *Lasiacis ruscifolia*.
14689. *Panicum geminatum*.
14741. *Panicum tenerum*.
14792. *Andropogon semiberbis*.
14923. *Panicum zizanioides*.

14934. *Cenchrus gracillimus*.
14939. *Paspalum bakeri*.
14944. *Eragrostis elliottii*.
14947. *Chloris petraea*.
14959. *Aristida erecta*.
14975. *Sporobolus cubensis*.
15009. *Sacciolepis vilvoldes*.
15015. *Paspalum plicatulum*.
15043. *Syntherisma sanguinalis*.
15045. *Cenchrus echinatus*.
15065. *Lasiacis ruscifolia*.
15092. *Sporobolus argutus*.
15110. *Andropogon leucostachyus*.
15114. *Paspalum neesii*.
15184. *Panicum nitidum*.
15188. *Reynaudia filiformis*.
15190. *Luziola bahiensis*.
15199. *Distichlis spicata*.
15247. *Syntherisma panicea*.
15257. *Panicum aquaticum*.
15272. *Panicum distantiflorum*.
15294. *Paspalum bakeri*.
15296. *Cenchrus viridis*.
15337. *Paspalum bakeri*.
15353. *Mesosetum loliforme*.
15354. *Paspalum plicatulum*.
15355. *Axonopus compressus*.
15356. *Panicum barbinode*.
15359. *Paspalum debile*.
15361. *Syntherisma leucocoma*.
15362. *Sporobolus indicus*.
15363. *Syntherisma sanguinalis*.
15364. *Panicum tenerum*.
15368. *Syntherisma leucocoma*.
15369. *Aristida refracta*.
15370. *Sporobolus indicus*.
15378. *Chaetochloa geniculata*.
15379. *Panicum lancearium*.
15380. *Panicum tenerum*.
15381. *Panicum exiguiflorum*.
15382. *Eragrostis cubensis*.
15383. *Panicum albomarginatum*.
15385. *Panicum tenerum*.
15520. *Eragrostis hypnoides*.
15549. *Lithachne pauciflora*.
15624. *Panicum parvifolium*.
15706. *Panicum erectifolium*.
15755. *Arthrostylidium capillifolium*.
15788. *Syntherisma sanguinalis*.
15790. *Paspalum caespitosum*.

BRITTON, N. L., AND BROWN, S.

5391. *Paspalum paniculatum*.
5392. *Panicum laxum*.

- 5398. *Panicum laxum*.
- 5512. *Leptochloa scabra*.
- 5513. *Eriochloa subglabra*.
- 5518. *Paspalum secans*.
- 5523. *Panicum reptans*.
- 5716. *Panicum laxum*.
- 5718. *Panicum portoricense*.
- 5719. *Eragrostis elliottii*.
- 5720. *Panicum parvifolium*.

BRITTON, N. L., AND COWELL, J. F.

- 238. *Sporobolus virginicus*.
- 245. *Eragrostis ciliaris*.
- 270. *Nazia aliena*.
- 282. *Echinochloa colonum*.
- 295. *Panicum trichoides*.
- 324. *Eragrostis tephrosanthos*.
- 359. *Syntherisma digitata*.
- 369. *Ichnanthus pallens*.
- 382. *Eragrostis ciliaris*.
- 394. *Panicum laxum*.
- 395. *Isachne disperma*.
- 432. *Panicum aquaticum*.
- 444. *Panicum trichoides*.
- 476. *Paspalum paniculatum*.
- 493. *Arthrostylidium sarmentosum*.
- 611. *Anthephora hermaphrodita*.
- 632. *Ichnanthus nemorosus*.
- 744. *Chaetochloa geniculata*.
- 883. *Ichnanthus pallens*.
- 895. *Arundinella confinis*.
- 949. *Ichnanthus pallens*.
- 953. *Arthrostylidium multispicatum*.
- 1008. *Ichnanthus axillaris*.
- 1013. *Paspalum paniculatum*.
- 1016. *Rytilix granularis*.
- 1321. *Bouteloua heterostega*.
- 1405. *Paspalum secans*.
- 1449. *Paspalum millegrana*.
- 1451. *Eriochloa punctata*.
- 1545. *Anthephora hermaphrodita*.
- 1980. *Panicum trichoides*.
- 2093. *Panicum barbinode*.
- 2180. *Arthrostylidium sarmentosum*.
- 2182. *Panicum laxum*.
- 2186. *Paspalum orbiculatum*.
- 4026. *Andropogon fastigiatus*.
- 4064. *Panicum diffusum*.
- 4069. *Panicum adpersum*.
- 4070. *Paspalum plicatulum*.
- 4074. *Bouteloua heterostega*.
- 4089. *Arundinella confinis*.

- 4090. *Panicum acuminatum*.
- 4118. *Paspalum decumbens*.
- 4139. *Ichnanthus pallens*.
- 4142. *Panicum trichoides*.
- 4147. *Andropogon bicornis*.
- 4148. *Panicum laxum*.
- 4149. *Paspalum paniculatum*.
- 4209. *Arthrostylidium sarmentosum*.
- 4222. *Arthrostylidium multispicatum*.
- 4265. *Eriochrysis cayennensis*.
- 4267. *Andropogon leucostachyus*.
- 4271. *Isachne angustifolia*.
- 4283. *Cymbopogon citratus*.
- 4286. *Panicum laxum*.
- 9830. *Eragrostis hypnoides*.
- 9853. *Distichlis spicata*.
- 9872. *Paspalum paniculatum*.
- 9931. *Panicum geminatum*.
- 9984. *Leptochloa fascicularis*.
- 12798. *Cenchrus viridis*.
- 12857. *Aristida scabra*.

BRITTON, N. L., COWELL, J. F., AND
BROWN, S.

- 3836. *Panicum portoricense*.
- 3848. *Eragrostis ciliaris*.
- 3853. *Panicum portoricense*.
- 3854. *Eragrostis ciliaris*.
- 3858. *Syntherisma panicea*.
- 4357. *Spartina patens juncea*.
- 4358. *Aristida refracta*.
- 4361. *Aristida portoricensis*.
- 4476. *Paspalum notatum*.
- 4477. *Andropogon leucostachyus*.
- 4490. *Lasiacis divaricata*.
- 4527. *Axonopus compressus*.
- 4532. *Chaetochloa geniculata*.
- 4617. *Panicum utowanaeum*.
- 4636. *Paspalum glabrum*.
- 4639. *Paspalum glabrum*.
- 4648. *Bouteloua heterostega*.
- 4650. *Eragrostis ciliaris*.
- 4655. *Leptochloa filiformis*.
- 4662. *Nazia aliena*.
- 4684. *Sporobolus argutus*.
- 4686. *Paspalum glabrum*.
- 4689. *Pappophorum alopecuroideum*.
- 4690. *Paspalum glabrum*.
- 4708. *Uniola virgata*.
- 4713. *Eragrostis ciliaris*.
- 4717. *Paspalum glabrum*.
- 4753. *Sporobolus indicus*.
- 4754. *Panicum utowanaeum*.

4791. *Panicum reptans*.
 4890. *Uniola virgata*.
 4909. *Paspalum glabrum*.
 4911. *Cenchrus echinatus*.
 4918. *Bouteloua juncea*.
 4955. *Lasiacis divaricata*.
 4956. *Nazia aliena*.
 4981. *Cenchrus echinatus*.
 4986. *Cenchrus viridis*.
 4989. *Chaetochloa geniculata*.
 4991. *Panicum adpersum*.
 5002. *Uniola virgata*.
 5003. *Eragrostis ciliaris*.
 5006. *Lasiacis divaricata*.
 5012. *Panicum utowanaeum*.
 5038. *Panicum maximum*.
 5041. *Paspalum glabrum*.
 5045. *Sporobolus argutus*.
 5046. *Cenchrus carolinianus*.
 5236. *Arthrostyldium sarmentosum*.
 5380. *Pennisetum ciliare*.
 5381. *Chloris paraguayensis*.
 5382. *Bouteloua heterostega*.
 5595. *Isachne angustifolia*.
 5600. *Arthrostyldium sarmentosum*.

BRITTON, N. L., COWELL, J. F., AND
 HESS, W. E.

1601. *Panicum utowanaeum*.
 1602. *Sporobolus virginicus*.
 1604. *Chaetochloa setosa*.
 1656. *Paspalum caespitosum*.
 1674. *Cenchrus myosuroides*.
 1676. *Dactyloctenium aegyptium*.
 1698. *Panicum utowanaeum*.
 1734. *Panicum utowanaeum*.
 1761. *Panicum adpersum*.
 1777. *Pappophorum alopecuroideum*.
 1780. *Sporobolus argutus*.
 1784. *Syntherisma digitata*.
 1831. *Chloris paraguayensis*.
 1839. *Paspalum caespitosum*.
 1875. *Sporobolus argutus*.

BRITTON, N. L., COWELL, J. F., AND
 SHAFER, J. A.

12979. *Lasiacis ruscifolia*.
 13043. *Leptochloa filiformis*.

BRITTON, N. L., AND EARLE, F. S.

6566. *Panicum dichotomiflorum*.

BRITTON, N. L., EARLE, F. S., AND
 GAGER, S.

6295. *Panicum reptans*.

BRITTON, N. L., AND FISHLOCK, W. C.

957. *Eragrostis ciliaris*.
 986. *Paspalum glabrum*.
 1041. *Paspalum glabrum*.
 1075. *Eragrostis ciliaris*.
 1097. *Paspalum plicatulum*.

BRITTON, N. L., AND GAGER, S.

7561. *Eragrostis prolifera*.

BRITTON, N. L., AND HESS, W. E.

2699. *Leptocoryphium lanatum*.
 2813. *Andropogon leucostachyus*.
 2833. *Paspalum conjugatum*.
 2835. *Paspalum orbiculatum*.

BRITTON, N. L., AND HOLLICK, A.

1729. *Leptothrium rigidum*.
 1746. *Aristida adscensionis*.
 2194. *Achlaena piptostachya*.

BRITTON, N. L., AND MILLSPAUGH, C. F.

2130. *Lasiacis divaricata*.
 2186. *Eragrostis prolifera*.
 2211. *Cenchrus microcephalus*.
 2236. *Eragrostis ciliaris*.
 2736. *Panicum nitidum*.
 2947. *Valota insularis*.
 2997. *Arthrostyldium capillifolium*.
 3089. *Paspalum caespitosum*.
 3108. *Leptochloa fascicularis*.
 5733. *Chloris polydactyla*.
 6309. *Aristida adscensionis*.

BRITTON, N. L., AND ROSE, J. N.

1414. *Uniola virgata*.

BRITTON, N. L., AND SHAFER, J. A.

223. *Pharus glaber*.
 257. *Paspalum glabrum*.
 278. *Sporobolus berterianus*.
 280. *Bouteloua americana*.

282. *Axonopus compressus*.
 292. *Paspalum glabrum*.
 305. *Andropogon bicornis*.
 334. *Panicum adpersum*.
 375. *Paspalum plicatulum*.
 382. *Panicum diffusum*.
 501. *Eragrostis amabilis*.
 506. *Paspalum glabrum*.
 606. *Chloris paraguayensis*.
 608. *Andropogon multinervosus*.
 611. *Panicum geminatum*.
 631. *Chaetochloa setosa*.
 633. *Bouteloua americana*.
 665. *Antheophora hermaphrodita*.
 694. *Paspalum glabrum*.
 698. *Sporobolus muralis*.
 700. *Eragrostis ciliaris*.
 711. *Panicum adpersum*.
 755. *Chloris radiata*.
 761. *Eriochloa punctata*.
 764. *Paspalum plicatulum*.
 765. *Andropogon bicornis*.
 791. *Panicum laxum*.
 808. *Panicum laxum*.
 835. *Olyra latifolia*.
 880. *Paspalum glabrum*.
 1520. *Chloris radiata*.
 1523. *Eriochloa subglabra*.
 1624. *Paspalum notatum*.
 1633. *Ichnanthus pallens*.
 1665. *Eragrostis hypnoides*.
 1680. *Paspalum decumbens*.
 1858. *Panicum geminatum*.
 1862. *Sporobolus argutus*.
 1873. *Sporobolus argutus*.
 1874. *Leptochloa filiformis*.
 1901. *Chaetochloa setosa*.
 2018. *Ichnanthus axillaris*.
 2042. *Arthrostylidium sarmentosum*.
 2135. *Paspalum decumbens*.
 2987. *Panicum reptans*.
 3002. *Panicum reptans*.
 3012. *Panicum barbinode*.
 3088. *Panicum distantiflorum*.

BRITTON, N. L., STEVENS, F. L., AND
Hess, W. E.

2395. *Paspalum glabrum*.
 2396. *Eragrostis elliotii*.
 2398. *Paspalum simpsoni*.
 2402. *Eragrostis ciliaris*.
 2419. *Panicum trichoides*.
 2566. *Isachne angustifolia*.

2576. *Ichnanthus pallens*.
 2623. *Lasiacis divaricata*.

BRITTON, N. L., AND WHEELER, W. M.

18. *Chaetochloa setosa*.
 47. *Leptochloa virgata*.
 48. *Valota insularis*.
 97. *Bambos vulgaris*.
 106. *Oplismenus setarius*.
 122. *Cenchrus viridis*.
 137. *Panicum fasciculatum*.
 140. *Syntherisma digitata*.
 141. *Chloris paraguayensis*.
 145. *Echinochloa colonum*.
 190. *Paspalum glabrum*.
 207. *Cenchrus echinatus*.
 233. *Chaetochloa setosa*.
 261. *Eragrostis ciliaris*.

BRITTON, N. L., AND WILSON, P.

148. *Paspalum cilliferum*.
 156a. *Eragrostis tephrosanthos*.
 5743. *Arthrostylidium capillifolium*.
 5758. *Sporobolus domingensis*.
 6116. *Paspalum capillifolium*.
 14016. *Oplismenus hirtellus*.
 14282. *Paspalum pulchellum*.
 14283. *Panicum albomarginatum*.
 14291. *Andropogon cubensis*.
 14292. *Sporobolus cubensis*.
 14305. *Panicum arenicoloides*.
 14316. *Achlaena piptostachya*.
 14320. *Panicum acuminatum*.
 14456. *Paspalum virgatum*.
 14695. *Paspalum minus*.
 14698. *Syntherisma sanguinalis*.
 14699. *Panicum exiguiflorum*.
 14701. *Panicum caricoides*.
 14705. *Panicum erectifolium*.
 14707. *Paspalum plicatulum*.
 14708. *Eragrostis elliotii*.
 14712. *Capriola dactylon*.
 14747. *Panicum lancearium*.
 14803. *Panicum aquaticum*.
 14804. *Andropogon nashianus*.
 14812. *Andropogon brevifolius*.
 14813. *Sporobolus indicus*.
 14814. *Syntherisma digitata*.
 14817. *Chaetochloa geniculata*.
 14860. *Lasiacis rugelii*.
 14890. *Paspalum caespitosum*.
 15134. *Lasiacis sloanei*.
 15155. *Bouteloua heterostega*.

15404. *Sporobolus argutus*.
 15438. *Andropogon bicornis*.
 15595. *Panicum laxum*.
 15612. *Eragrostis glutinosa*.
 15665. *Paspalum simpsoni*.
 15674. *Panicum acuminatum*.
 15679. *Sacciolepis vilvroides*.
 15805. *Paspalum multicaule*.

BROADWAY, W. E.

7. *Pharus latifolia*.
 10. *Syntherisma digitata*.
 25. *Sporobolus indicus*.
 43. *Eragrostis pilosa*.
 62. *Paspalum saccharoides*.
 94. *Panicum trichoides*.
 123. *Chaetochloa palmifolia*.
 130. *Syntherisma digitata*.
 131. *Paspalum paniculatum*.
 144. *Paspalum virgatum*.
 148. *Panicum pilosum*.
 177. *Ichnanthus nemorosus*.
 184. *Antheophora hermaphrodita*.
 192. *Paspalum saccharoides*.
 217. *Bouteloua americana*.
 227. *Lasiacis sloanei*.
 249. *Leptochloa filiformis*.
 250. *Leptochloa filiformis*.
 253. *Andropogon fastigiatus*.
 255. *Paspalum glabrum*.
 513. *Andropogon bicornis*.
 566. *Panicum laxum*.
 617. *Sporobolus littoralis*.
 665. *Paspalum glabrum*.
 721. *Panicum reptans*.
 724. *Eragrostis amabilis*.
 843. *Paspalum saccharoides*.
 847. *Axonopus compressus*.
 909. *Paspalum virgatum*.
 947. *Lasiacis sloanei*.
 967. *Andropogon bicornis*.
 978. *Chloris radiata*.
 979. *Antheophora hermaphrodita*.
 1103. *Ichnanthus pallens*.
 1104. *Oplimeneus hirtellus*.
 1124. *Leptochloa virgata*.
 1126. *Chaetochloa geniculata*.
 1133. *Lasiacis divaricata*.
 1385. *Lasiacis sloanei*.
 1530. *Eriochloa punctata*.
 1626. *Luziola spruceana*.
 1670. *Bouteloua americana*.

1682. *Eragrostis pilosa*.
 1729. *Paspalum nutans*.
 1744. *Paspalum conjugatum pubescens*.
 1782. *Valota laxa*.
 1783. *Andropogon condensatus*.
 1793. *Paspalum distichum*.
 1793½. *Paspalum notatum*.
 1870. *Panicum laxum*.
 1922. *Syntherisma longiflora*.
 2126. *Paspalum multicaule*.
 2141. *Hymenachne amplexicaulis*.
 2142. *Sacciolepis myuros*.
 2246. *Bambos vulgaris*.
 2279. *Chloris radiata*.
 2370. *Panicum stoloniferum*.
 2371. *Panicum frondescens*.
 2372. *Panicum parvifolium*.
 2373. *Andropogon virgatus*.
 2374. *Eriochrysis cayennensis*.
 2375. *Raddia biformis*.
 2377. *Panicum cyanescens*.
 2390. *Panicum frondescens*.
 2504. *Lasiacis ruscifolia*.
 2563. *Panicum zizanioides*.
 2564. *Lasiacis ruscifolia*.
 2603. *Paspalum pilosum*.
 2609. *Cenchrus viridis*.
 2618. *Paspalum densum*.
 2627. *Lasiacis ruscifolia*.
 2629. *Panicum hirsutum*.
 2811. *Paspalum nutans*.
 2837. *Panicum polygonatum*.
 2910. *Leptochloa filiformis*.
 2920. *Andropogon bicornis*.
 2982. *Andropogon selloanus*.
 2996. *Paspalum paniculatum*.
 3004. *Raddia urbaniana*.
 3043. *Holcus sorghum*.
 3045. *Paspalum vaginatum*.
 3066. *Paspalum millegrana*.
 3068. *Panicum altum*.
 3100. *Luziola spruceana*.
 3148. *Paspalum plicatulum*.
 3258. *Andropogon selloanus*.
 3260. *Andropogon bicornis*.
 3269. *Oryza sativa*.
 3412. *Bambos vulgaris*.
 3551. *Lasiacis ligulata*.
 3712. *Panicum laxum*.
 3820. *Ichnanthus pallens*.
 3977. *Panicum fasciculatum*.
 3978. *Sporobolus littoralis*.

3979. *Paspalum saccharoides*.
 3996. *Oplismenus hirtellus*.
 4018. *Andropogon bicornis*.
 4038. *Lasiacis ligulata*.
 4039. *Ichnanthus pallens*.
 4044. *Andropogon selloanus*.
 4058. *Paspalum virgatum*.
 4059. *Eragrostis pilosa*.
 4063. *Panicum pilosum*.
 4080. *Ichnanthus pallens*.
 4081. *Panicum maximum*.
 4175. *Cymbopogon nardus*.
 4335. *Chaetochloa barbata*.
 4358. *Stenotaphrum secundatum*.
 4359. *Sporobolus littoralis*.
 4360. *Raddia urbaniana*.
 4361. *Paspalum conjugatum*.
 4362. *Olyra latifolia*.
 4385. *Bouteloua americana*.
 4388. *Sporobolus littoralis*.
 4390. *Paspalum virgatum*.
 4472. *Ichnanthus nemoralis*.
 4475. *Axonopus compressus*.
 4476. *Panicum polygonatum*.
 4513. *Paspalum distichum*.
 4535. *Syntherisma digitata*.
 4556. *Panicum zizanioides*.
 4564. *Oplismenus hirtellus*.
 4585. *Eragrostis ciliaris*.
 4595. *Leptochloa filiformis*.
 4615. *Ichnanthus pallens*.
 4616. *Paspalum plicatulum*.
 4617. *Eriochloa punctata*.
 4620. *Arundinella confinis*.
 4629. *Sporobolus indicus*.
 4630. *Panicum fasciculatum*.
 4648. *Echinochloa colonum*.
 4649. *Chloris radiata*.
 4655. *Paspalum vaginatum*.
 4666. *Lasiacis sloanei*.
 4668. *Panicum laxum*.
 4682. *Anatherum zizanioides*.
 4683. *Pennisetum setosum*.
 4685. *Paspalum paniculatum*.
 4686. *Chaetochloa geniculata*.
 4696. *Paspalum millegrana*.
 4726. *Cenchrus echinatus*.
 4727. *Andropogon pertusus panormi-*
 tanus.
 4737. *Chaetochloa barbata*.
 4739. *Leptochloa scabra*.
 4787. *Imperata brasiliensis*.
 4799. *Andropogon condensatus*.
 4806. *Leptochloa virgata*.
 4817. *Oplismenus hirtellus*.
 4840. *Panicum barbinode*.
 4841. *Lasiacis patentiflora*.
 4851. *Valota laxa*.
 4852. *Sporobolus indicus*.
 4891. *Panicum trigonum*.
 4892. *Leptochloa filiformis*.
 4893. *Valota insularis*.
 4894. *Arthrostylidium excelsum*.
 4895. *Panicum hirsutum*.
 4896. *Echinochloa spectabilis*.
 4897. *Phragmites phragmites*.
 4898. *Chaetochloa vulpiseta*.
 4899. *Valota insularis*.
 4911. *Ichnanthus pallens*.
 4912. *Ichnanthus tenuis*.
 4913. *Ichnanthus tenuis*.
 4914. *Paspalum nutans*.
 4915. *Stenotaphrum secundatum*.
 4916. *Cenchrus viridis*.
 4917. *Hymenachne amplexicaulis*.
 4919. *Sporobolus argutus*.
 4920. *Panicum geminatum*.
 4921. *Paspalum millegrana*.
 4922. *Arthrostylidium prestoel*.
 4923. *Lasiacis ligulata*.
 4924. *Lasiacis sorghoidea*.
 4925. *Axonopus compressus*.
 4926. *Panicum trichoides*.
 4927. *Orthoclada laxa*.
 4928. *Oplismenus hirtellus*.
 4929. *Streptochaeta spicata*.
 4930. *Pharus latifolius*.
 4931. *Ichnanthus nemorosus*.
 4932. *Streptogyne crinita*.
 4933. *Olyra latifolia*.
 4935. *Stenotaphrum secundatum*.
 4936. *Echinochloa colonum*.
 4937. *Leptochloa scabra*.
 4938. *Valota insularis*.
 4939. *Paspalum virgatum*.
 4940. *Eragrostis glomerata*.
 4941. *Eragrostis glomerata*.
 4942. *Leptochloa virgata*.
 4943. *Manisuris exaltatus*.
 4944. *Valota insularis*.
 4945. *Andropogon condensatus*.
 4947. *Paspalum virgatum*.
 4949. *Andropogon condensatus*.
 4950. *Chloris radiata*.
 4951. *Syntherisma sanguinalis*.
 4952. *Lasiacis ligulata*.

4953. *Eragrostis tephrosanthos*.
 4954. *Orthoclada laxa*.
 4955. *Pharus parvifolius*.
 4956. *Panicum laxum*.
 4957. *Panicum grande*.
 4958. *Oplismenus hirtellus*.
 4959. *Lasiacis ligulata*.
 4960. *Ichnanthus pallens*.
 4961. *Syntherisma longiflora*.
 4962. *Tricholaena rosea*.
 4963. *Imperata contracta*.
 4964. *Pennisetum setosum*.
 4965. *Manisuris exaltata*.
 4966. *Antheophora hermaphrodita*.
 4967. *Syntherisma digitata*.
 4968. *Andropogon bicornis*.
 4969. *Paspalum pilosum*.
 4970. *Paspalum plicatulum*.
 4971. *Sporobolus indicus*.
 4972. *Syntherisma digitata*.
 4973. *Panicum trichanthum*.
 4974. *Eragrostis ciliaris*.
 4975. *Syntherisma digitata*.
 4976. *Lasiacis sorghoidea*.
 4977. *Ichnanthus pallens*.
 4978. *Hymenachne auriculata*.
 4979. *Eragrostis glomerata*.
 4980. *Panicum hirsutum*.
 4981. *Andropogon selloanus*.
 4982. *Tripsacum dactyloides*.
 4983. *Paspalum convexum*.
 4984. *Panicum barbinode*.
 4985. *Panicum laxum*.
 4986. *Panicum pilosum*.
 4987. *Paspalum virgatum*.
 4988. *Pharus parvifolius*.
 7015. *Cenchrus echinatus*.

BROOKS, A. J.

20. *Chloris paraguayensis*.
 23. *Echinochloa colonum*.
 24. *Capriola dactylon*.
 27. *Eleusine indica*.
 28. *Antheophora hermaphrodita*.
 29. *Paspalum virgatum*.
 30. *Andropogon condensatus*.
 31. *Leptochloa virgata*.
 32. *Syntherisma digitata*.
 33. *Dactyloctenium aegyptium*.
 34. *Paspalum conjugatum*.
 35. *Dactyloctenium aegyptium*.
 38. *Eleusine indica*.

BROWN, S.

473. *Koeleria phleoides*.
 474. *Poa annua*.
 478. *Poa annua*.
 521. *Scleropoa rigida*.
 522. *Sporobolus berterioanus*.
 523. *Chloris petraea*.
 600. *Koeleria phleoides*.
 601. *Scleropoa rigida*.
 605. *Koeleria phleoides*.
 614. *Scleropoa rigida*.
 617. *Koeleria phleoides*.
 622. *Arundo donax*.

BROWN, S., AND BRITTON, N. L.

5. *Chaetochloa geniculata*.
 13. *Oplismenus setarius*.
 20. *Panicum maximum*.
 21. *Panicum capillare*.
 56. *Paspalum propinquum*.
 57. *Syntherisma longiflora*.
 58. *Sporobolus berterioanus*.
 60. *Chloris petraea*.
 63. *Stenotaphrum secundatum*.
 65. *Syntherisma digitata*.
 100. *Paspalum vaginatum*.
 116. *Chaetochloa verticillata*.
 126. *Cenchrus echinatus*.
 128. *Cenchrus tribuloides*.
 130. *Holcus halepensis*.
 213. *Arundo donax*.
 225. *Andropogon virginicus*.
 302. *Chaetochloa verticillata*.
 313. *Spartina patens juncea*.
 379. *Eleusine indica*.
 826. *Paspalum distichum*.

BUCH, W.

929. *Arthrostylidium haitiense*.
 956. *Panicum glutinosum*.
 961. *Andropogon urbanianus*.
 1010. *Bouteloua juncea*.
 1071. *Andropogon gracilis*.
 1074. *Andropogon urbanianus*.
 1077. *Andropogon urbanianus*.
 1091. *Paspalum heterotrichon*.
 1093. *Arundo donax*.

CALDWELL, O., AND BAKER, C. F.

7011. *Olyra strephioides*.
 7136. *Panicum laxum*.
 7139. *Panicum fusiforme*.

CHASE, A.

6150. *Paspalum secans*.
 6151. *Paspalum plicatulum*.
 6152. *Paspalum conjugatum*.
 6153. *Paspalum millegrana*.
 6154. *Paspalum paniculatum*.
 6155. *Panicum laxum*.
 6156. *Sporobolus indicus*.
 6157. *Lasiacis divaricata*.
 6160. *Axonopus compressus*.
 6161. *Andropogon semiberbis*.
 6162. *Andropogon bicornis*.
 6163. *Andropogon leucostachyus*.
 6164. *Paspalum millegrana*.
 6165. *Andropogon glomeratus*.
 6166. *Chaetochloa geniculata*.
 6167. *Panicum trichoides*.
 6168. *Syntherisma digitata*.
 6169. *Eleusine indica*.
 6170. *Paspalum decumbens*.
 6171. *Andropogon brevifolius*.
 6172. *Paspalum melanospermum*.
 6173. *Paspalum virgatum*.
 6174. *Paspalum secans*.
 6175. *Olyra latifolia*.
 6176. *Paspalum decumbens*.
 6177. *Olyra latifolia*.
 6178. *Paspalum leoninum*.
 6179. *Chloris radiata*.
 6180. *Syntherisma sanguinalis*.
 6181. *Eragrostis tephrosanthos*.
 6182. *Paspalum glabrum*.
 6183. *Chloris petraea*.
 6184. *Sporobolus indicus*.
 6186. *Paspalum decumbens*.
 6187. *Paspalum millegrana*.
 6189. *Oplismenus hirtellus*.
 6190. *Arthrostylidium sarmentosum*.
 6191. *Panicum trichoides*.
 6192. *Lasiacis divaricata*.
 6193. *Paspalum secans*.
 6194. *Rytilix granularis*.
 6195. *Chaetochloa geniculata*.
 6196. *Ichnanthus pallens*.
 6197. *Panicum fasciculatum*.
 6198. *Panicum schiffneri*.
 6199. *Panicum glutinosum*.
 6200. *Olyra latifolia*.
 6201. *Arthrostylidium multispicatum*.
 6202. *Andropogon hirtiflorus*.
 6203. *Andropogon glomeratus*.
 6206. *Andropogon bicornis*.
 6216. *Andropogon leucostachyus*.
 6217. *Chloris radiata*.
 6218. *Lasiacis sorghoidea*.
 6220. *Paspalum leoninum*.
 6221. *Syntherisma argillacea*.
 6222. *Isachne angustifolia*.
 6223. *Arthrostylidium sarmentosum*.
 6224. *Lasiacis harrisii*.
 6225. *Lasiacis divaricata*.
 6226. *Andropogon saccharoides*.
 6227. *Bouteloua heterostega*.
 6228. *Lasiacis harrisii*.
 6229. *Oplismenus hirtellus*.
 6230. *Sporobolus berterianus*.
 6231. *Chaetochloa geniculata*.
 6232. *Paspalum portoricense*.
 6233. *Paspalum distichum*.
 6234. *Paspalum melanospermum*.
 6235. *Paspalum decumbens*.
 6236. *Paspalum notatum*.
 6237. *Paspalum millegrana*.
 6238. *Paspalum secans*.
 6239. *Paspalum paniculatum*.
 6240. *Valota insularis*.
 6241. *Dactyloctenium aegyptium*.
 6242. *Cenchrus echinatus*.
 6243. *Eragrostis tephrosanthos*.
 6244. *Bambos vulgaris*.
 6246. *Paspalum leoninum*.
 6247. *Panicum schiffneri*.
 6248. *Arthrostylidium capillifolium*.
 6249. *Panicum acuminatum*.
 6251. *Eriochloa punctata*.
 6252. *Echinochloa colonum*.
 6253. *Syntherisma sanguinalis*.
 6254. *Eriochloa subglabra*.
 6255. *Syntherisma longiflora*.
 6256. *Panicum maximum*.
 6257. *Paspalum virgatum*.
 6257. *Paspalum millegrana*.
 6258. *Hymenachne amplexicaulis*.
 6259. *Paspalum leoninum*.
 6260. *Coix lachryma-jobi*.
 6261. *Paspalum secans*.
 6262. *Paspalum portoricense*.
 6263. *Panicum fasciculatum*.
 6264. *Paspalum decumbens*.
 6265. *Lithachne pauciflora*.
 6266. *Pharus glaber*.
 6268. *Bouteloua heterostega*.
 6269. *Aristida portoricensis*.
 6270. *Andropogon saccharoides*.
 6271. *Syntherisma argillacea*.

6272. *Leptocoryphium lanatum*.
 6273. *Panicum aciculare*.
 6274. *Paspalum leoninum*.
 6275. *Paspalum leoninum*.
 6276. *Panicum polycaulon*.
 6277. *Syntherisma argillacea*.
 6278. *Stenotaphrum secundatum*.
 6279. *Paspalum glabrum*.
 6280. *Dactyloctenium aegyptium*.
 6281. *Cenchrus echinatus*.
 6282. *Paspalum propinquum*.
 6283. *Sporobolus virginicus*.
 6284. *Valota insularis*.
 6285. *Eragrostis ciliaris*.
 6286. *Panicum adpersum*.
 6287. *Paspalum notatum*.
 6288. *Panicum geminatum*.
 6289. *Leptochloa scabra*.
 6290. *Echinochloa sabulicola*.
 6291. *Homalocenchrus hexandrus*.
 6292. *Andropogon bicornis*.
 6293. *Chloris paraguayensis*.
 6294. *Capriola dactylon*.
 6295. *Eragrostis tephrosanthos*.
 6296. *Paspalum fimbriatum*.
 6297. *Cymbopogon nardus*.
 6298. *Aristida portoricensis*.
 6299. *Paspalum leoninum*.
 6300. *Paspalum glabrum*.
 6301. *Bouteloua heterostega*.
 6302. *Panicum adpersum*.
 6303. *Paspalum millegrana*.
 6304. *Chaetochloa geniculata*.
 6305. *Panicum reptans*.
 6306. *Paspalum glabrum*.
 6307. *Paspalum vaginatum*.
 6308. *Panicum diffusum*.
 6309. *Paspalum secans*.
 6310. *Lasiacis divaricata*.
 6311. *Lithachne pauciflora*.
 6312. *Paspalum leoninum*.
 6313. *Paspalum glabrum*.
 6314. *Paspalum notatum*.
 6315. *Paspalum leoninum*.
 6316. *Paspalum millegrana*.
 6317. *Hymenachne amplexicaulis*.
 6318. *Panicum geminatum*.
 6319. *Echinochloa spectabilis*.
 6321. *Ichnanthus pallens*.
 6322. *Paspalum portoricense*.
 6323. *Paspalum rupestre*.
 6324. *Holcus sorghum sudanensis*.
 6326. *Panicum reptans*.
 6327. *Bouteloua heterostega*.
 6328. *Valota insularis*.
 6329. *Paspalum fimbriatum*.
 6330. *Eragrostis ciliaris*.
 6331. *Syntherisma digitata*.
 6332. *Panicum maximum*.
 6333. *Panicum adpersum*.
 6334. *Olyra latifolia*.
 6335. *Lasiacis divaricata*.
 6336. *Andropogon bicornis*.
 6337. *Stenotaphrum secundatum*.
 6338. *Paspalum portoricense*.
 6339. *Paspalum plicatulum*.
 6340. *Paspalum decumbens*.
 6341. *Panicum laxum*.
 6342. *Chaetochloa geniculata*.
 6343. *Paspalum vaginatum*.
 6344. *Paspalum notatum*.
 6345. *Stenotaphrum secundatum*.
 6345½. *Cenchrus carolinianus*.
 6346. *Paspalum glabrum*.
 6347. *Chloris petraea*.
 6348. *Sporobolus virginicus*.
 6349. *Spartina patens juncea*.
 6350. *Eriochloa subglabra*.
 6351. *Panicum condensum*.
 6352. *Echinochloa sabulicola*.
 6353. *Sacciolepis striata*.
 6354. *Panicum laxum*.
 6355. *Andropogon glomeratus*.
 6356. *Paspalum millegrana*.
 6357. *Panicum portoricense*.
 6358. *Panicum parvifolium*.
 6359. *Paspalum millegrana*.
 6361. *Paspalum decumbens*.
 6362. *Ichnanthus pallens*.
 6363. *Panicum laxum*.
 6364. *Syntherisma sanguinalis*.
 6365. *Lasiacis divaricata*.
 6366. *Andropogon leucostachyus*.
 6367. *Paspalum glabrum*.
 6368. *Paspalum minus*.
 6369. *Paspalum glabrum*.
 6370. *Sorghastrum parviflorum*.
 6371. *Chaetochloa vulpiseta*.
 6372. *Paspalum secans*.
 6373. *Paspalum millegrana*.
 6374. *Chaetochloa geniculata*.
 6375. *Valota insularis*.
 6376. *Panicum fasciculatum*.
 6377. *Chaetochloa geniculata*.
 6378. *Panicum acuminatum*.
 6379. *Lasiacis divaricata*.

6380. *Eriochloa punctata*.
 6381. *Echinochloa colonum*.
 6382. *Paspalum secans*.
 6383. *Andropogon leucostachyus*.
 6384. *Andropogon brevifolius*.
 6385. *Andropogon bicornis*.
 6386. *Cenchrus echinatus*.
 6387. *Paspalum secans*.
 6388. *Chloris radiata*.
 6389. *Paspalum conjugatum*.
 6390. *Paspalum paniculatum*.
 6391. *Eragrostis tephrosanthos*.
 6392. *Leptochloa scabra*.
 6393. *Eragrostis ciliaris*.
 6394. *Eragrostis pilosa*.
 6395. *Panicum reptans*.
 6396. *Echinochloa sabulicola*.
 6397. *Homalocenchrus hexandrus*.
 6398. *Eragrostis hypnoides*.
 6399. *Paspalum decumbens*.
 6401. *Paspalum notatum*.
 6402. *Paspalum glabrum*.
 6403. *Pharus glaber*.
 6404. *Paspalum conjugatum*.
 6405. *Ichnanthus pallens*.
 6406. *Anatherum zizanioides*.
 6407. *Panicum elephantipes*.
 6408. *Paspalum glabrum*.
 6409. *Paspalum secans*.
 6410. *Lithachne pauciflora*.
 6411. *Ichnanthus pallens*.
 6412. *Lasiacis sloanei*.
 6413. *Oplismenus setarius*.
 6414. *Hymenachne amplexicaulis*.
 6415. *Panicum elephantipes*.
 6416. *Olyra latifolia*.
 6417. *Panicum trichoides*.
 6418. *Ichnanthus pallens*.
 6419. *Lasiacis sorghoidea*.
 6420. *Lasiacis divaricata*.
 6421. *Sorghastrum parviflorum*.
 6422. *Eragrostis tephrosanthos*.
 6423. *Paspalum glabrum*.
 6424. *Paspalum notatum*.
 6425. *Dactyloctenium aegyptium*.
 6426. *Olyra latifolia*.
 6427. *Paspalum caespitosum*.
 6428. *Paspalum portoricense*.
 6429. *Stenotaphrum secundatum*.
 6430. *Paspalum plicatulum*.
 6431. *Lasiacis divaricata*.
 6432. *Eragrostis ciliaris*.
 6433. *Paspalum propinquum*.
 6434. *Panicum portoricense*.
 6435. *Syntherisma panicea*.
 6436. *Antheophora hermaphrodita*.
 6437. *Paspalum glabrum*.
 6438. *Imperata contracta*.
 6440. *Panicum laxum*.
 6441. *Paspalum millegrana*.
 6442. *Gynierium sagittatum*.
 6443. *Lasiacis divaricata*.
 6444. *Paspalum secans*.
 6445. *Eriochloa subglabra*.
 6446. *Paspalum glabrum*.
 6449. *Pharus glaber*.
 6450. *Ichnanthus pallens*.
 6453. *Eriochloa subglabra*.
 6454. *Lasiacis ligulata*.
 6456. *Lithachne pauciflora*.
 6457. *Lasiacis sorghoidea*.
 6458. *Eriochloa subglabra*.
 6459. *Paspalum paniculatum*.
 6460. *Syntherisma sanguinalis*.
 6462. *Lasiacis divaricata*.
 6463. *Rytilix granularis*.
 6464. *Gynierium sagittatum*.
 6465. *Paspalum secans*.
 6466. *Paspalum plicatulum*.
 6467. *Eriochloa punctata*.
 6468. *Arthrostylidium sarmentosum*.
 6469. *Panicum glutinosum*.
 6470. *Panicum multispicatum*.
 6471. *Panicum aquaticum*.
 6472. *Ichnanthus axillaris*.
 6473. *Paspalum decumbens*.
 6474. *Panicum schiffneri*.
 6475. *Panicum acuminatum*.
 6476. *Oplismenus hirtellus*.
 6477. *Eriochloa punctata*.
 6478. *Paspalum paniculatum*.
 6479. *Chaetochloa geniculata*.
 6480. *Andropogon glomeratus*.
 6481. *Syntherisma sanguinalis*.
 6482. *Eragrostis tephrosanthos*.
 6483. *Paspalum distichum*.
 6484. *Bouteloua heterostega*.
 6485. *Eragrostis amabilis*.
 6485½. *Bouteloua heterostega*.
 6486. *Leptochloa virgata*.
 6487. *Panicum trichanthum*.
 6488. *Chaetochloa setosa*.
 6489. *Paspalum caespitosum*.
 6490. *Homalocenchrus monandrus*.
 6491. *Cenchrus echinatus*.
 6492. *Leptochloa filiformis*.

6493. *Leptochloa scabra*.
 6494. *Paspalum distichum*.
 6495. *Chloris ciliata*.
 6496. *Sporobolus argutus*.
 6497. *Sporobolus virginicus*.
 6498. *Arundo donax*.
 6499. *Paspalum glabrum*.
 6500. *Sporobolus argutus*.
 6501. *Eragrostis ciliaris*.
 6502. *Chaetochloa rariflora*.
 6503. *Eragrostis ciliaris*.
 6504. *Bouteloua heterostega*.
 6505. *Chaetochloa setosa*.
 6506. *Aristida adscensionis*.
 6507. *Aristida cognata*.
 6508. *Aristida refracta*.
 6509. *Anthephora hermaphrodita*.
 6510. *Aristida adscensionis*.
 6510½. *Syntherisma sanguinalis*.
 6511. *Panicum geminatum*.
 6512. *Chloris petraea*.
 6513. *Chloris paraguayensis*.
 6514. *Panicum adpersum*.
 6515. *Panicum reptans*.
 6516. *Leptochloa filiformis*.
 6517. *Cenchrus viridis*.
 6518. *Chaetochloa setosa*.
 6519. *Chaetochloa setosa*.
 6521. *Lasiacis divaricata*.
 6522. *Cenchrus echinatus*.
 6523. *Panicum fasciculatum*.
 6524. *Homalocenchrus monandrus*.
 6525. *Valota insularis*.
 6526. *Uniola virgata*.
 6528. *Panicum barbinode*.
 6529. *Chloris paraguayensis*.
 6530. *Echinochloa colonum*.
 6531. *Panicum geminatum*.
 6532. *Lasiacis divaricata*.
 6533. *Panicum utowanaeum*.
 6534. *Nazia aliena*.
 6535. *Panicum utowanaeum*.
 6536. *Chaetochloa setosa*.
 6537. *Paspalum fimbriatum*.
 6539. *Bouteloua americana*.
 6541. *Chaetochloa setosa*.
 6542. *Panicum fasciculatum*.
 6543. *Lasiacis divaricata*.
 6544. *Syntherisma digitata*.
 6545. *Axonopus compressus*.
 6546. *Paspalum plicatulum*.
 6547. *Panicum ghiesbreghtii*.
 6548. *Syntherisma sanguinalis*.
 6549. *Panicum laxum*.
 6550. *Paspalum fimbriatum*.
 6551. *Leptochloa filiformis*.
 6552. *Panicum geminatum*.
 6553. *Paspalum paniculatum*.
 6554. *Eriochloa subglabra*.
 6555. *Andropogon glomeratus*.
 6556. *Oplismenus setarius*.
 6557. *Muhlenbergia capillaris*.
 6558. *Andropogon gracilis*.
 6559. *Paspalum secans*.
 6560. *Lasiacis divaricata*.
 6561. *Cenchrus carolinianus*.
 6562. *Spartina patens juncea*.
 6563. *Cenchrus echinatus*.
 6564. *Sporobolus indicus*.
 6565. *Paspalum millegrana*.
 6566. *Cenchrus echinatus*.
 6567. *Panicum diffusum*.
 6568. *Syntherisma digitata*.
 6569. *Lithachne pauciflora*.
 6570. *Olyra latifolia*.
 6571. *Ichnanthus pallens*.
 6572. *Paspalum propinquum*.
 6573. *Paspalum glabrum*.
 6574. *Paspalum caespitosum*.
 6575. *Paspalum glabrum*.
 6576. *Syntherisma digitata*.
 6578. *Lasiacis harrisii*.
 6579. *Paspalum simpsoni*.
 6580. *Paspalum simpsoni*.
 6581. *Paspalum secans*.
 6582. *Andropogon brevifolius*.
 6583. *Echinochloa sabulicola*.
 6584. *Paspalum glabrum*.
 6585. *Paspalum notatum*.
 6586. *Andropogon glomeratus*.
 6587. *Lasiacis divaricata*.
 6588. *Paspalum poiretii*.
 6589. *Andropogon gracilis*.
 6590. *Chaetochloa geniculata*.
 6591. *Paspalum glabrum*.
 6592. *Paspalum plicatulum*.
 6593. *Andropogon fastigiatus*.
 6594. *Arundinella confinis*.
 6595. *Axonopus compressus*.
 6596. *Echinochloa sabulicola*.
 6597. *Paspalum poiretii*.
 6598. *Paspalum poiretii*.
 6599. *Paspalum virgatum*.
 6600. *Leptochloa virgata*.
 6601. *Paspalum glabrum*.
 6602. *Stenotaphrum secundatum*.

6603. *Spartina patens juncea*.
 6604. *Cenchrus carolinianus*.
 6605. *Paspalum simpsoni*.
 6605½. *Paspalum glabrum*.
 6606. *Lasiacis divaricata*.
 6607. *Paspalum portoricense*.
 6608. *Paspalum portoricense*.
 6609. *Paspalum glabrum*.
 6610. *Lasiacis divaricata*.
 6611. *Gymnopogon foliosus*.
 6613. *Paspalum propinquum*.
 6614. *Aristida spiciformis*.
 6615. *Panicum parvifolium*.
 6616. *Panicum stevensianum*.
 6617. *Panicum tenerum*.
 6618. *Paspalum glabrum*.
 6619. *Syntherisma digitata*.
 6620. *Andropogon virgatus*.
 6621. *Panicum polycaulon*.
 6622. *Andropogon fastigiatus*.
 6623. *Andropogon semiberbis*.
 6624. *Panicum aciculare*.
 6625. *Paspalum glabrum*.
 6626. *Paspalum millegrana*.
 6627. *Pharus glaber*.
 6628. *Ichnanthus pallens*.
 6629. *Ichnanthus pallens*.
 6630. *Panicum parvifolium*.
 6631. *Panicum portoricense*.
 6632. *Andropogon brevifolius*.
 6633. *Andropogon virgatus*.
 6634. *Eragrostis elliottii*.
 6634½. *Paspalum propinquum*.
 6635. *Paspalum glabrum*.
 6636. *Andropogon leucostachyus*.
 6637. *Paspalum millegrana*.
 6638. *Sorghastrum parviflorum*.
 6639. *Paspalum notatum*.
 6640. *Ichnanthus pallens*.
 6641. *Paspalum secans*.
 6642. *Paspalum virgatum*.
 6643. *Sporobolus berterioanus*.
 6644. *Paspalum plicatulum*.
 6645. *Olyra latifolia*.
 6646. *Paspalum millegrana*.
 6647. *Panicum acuminatum*.
 6648. *Paspalum decumbens*.
 6649. *Paspalum virgatum*.
 6650. *Paspalum millegrana*.
 6651. *Andropogon brevifolius*.
 6652. *Paspalum plicatulum*.
 6653. *Stenotaphrum secundatum*.
 6654. *Cenchrus echinatus*.
 6655. *Paspalum millegrana*.
 6656. *Eriochloa subglabra*.
 6657. *Panicum barbinode*.
 6658. *Paspalum glabrum*.
 6659. *Sporobolus indicus*.
 6660. *Andropogon bicornis*.
 6661. *Paspalum propinquum*.
 6662. *Bouteloua americana*.
 6663. *Lasiacis divaricata*.
 6664. *Panicum reptans*.
 6665. *Paspalum fimbriatum*.
 6666. *Bouteloua americana*.
 6667. *Cenchrus viridis*.
 6668. *Cenchrus echinatus*.
 6669. *Panicum maximum*.
 6670. *Syntherisma sanguinalis*.
 6671. *Axonopus compressus*.
 6672. *Syntherisma digitata*.
 6673. *Dactyloctenium aegyptium*.
 6674. *Eleusine indica*.
 6675. *Eragrostis ciliaris*.
 6676. *Sporobolus littoralis*.
 6677. *Stenotaphrum secundatum*.
 6678. *Paspalum glabrum*.
 6679. *Panicum barbinode*.
 6680. *Sporobolus berterioanus*.
 6682. *Oplismenus setarius*.
 6683. *Lasiacis divaricata*.
 6684. *Valota insularis*.
 6685. *Leptochloa virgata*.
 6686. *Panicum adpersum*.
 6687. *Paspalum millegrana*.
 6688. *Syntherisma sanguinalis*.
 6689. *Echinochloa colonum*.
 6690. *Paspalum distichum*.
 6691. *Chloris paraguayensis*.
 6693. *Panicum fasciculatum*.
 6694. *Paspalum vaginatum*.
 6695. *Sporobolus virginicus*.
 6696. *Cenchrus carolinianus*.
 6697. *Paspalum glabrum*.
 6698. *Paspalum secans*.
 6699. *Spartina patens juncea*.
 6700. *Panicum reptans*.
 6701. *Leptochloa virgata*.
 6702. *Chloris petraea*.
 6703. *Paspalum virgatum*.
 6704. *Paspalum millegrana*.
 6705. *Paspalum virgatum*.
 6706. *Paspalum virgatum*.
 6707. *Paspalum secans*.
 6708. *Andropogon bicornis*.
 6709. *Chaetochloa geniculata*.

6710. *Andropogon brevifolius*.
 6711. *Eragrostis hypnoides*.
 6712. *Eriochloa punctata*.
 6713. *Panicum laxum*.
 6714. *Eriochloa subglabra*.
 6715. *Leptochloa scabra*.
 6716. *Paspalum secans*.
 6717. *Ichnanthus pallens*.
 6718. *Paspalum decumbens*.
 6719. *Panicum acuminatum*.
 6720. *Chaetochloa geniculata*.
 6722. *Paspalum conjugatum*.
 6723. *Paspalum secans*.
 6724. *Paspalum melanospermum*.
 6725. *Paspalum millegrana*.
 6726. *Lasiacis divaricata*.
 6727. *Paspalum paniculatum*.
 6728. *Lasiacis sorghoidea*.
 6729. *Paspalum notatum*.
 6730. *Arthrostylidium sarmentosum*.
 6731. *Arthrostylidium sarmentosum*.
 6732. *Olyra latifolia*.
 6733. *Andropogon leucostachyus*.
 6734. *Lasiacis ligulata*.
 6735. *Ichnanthus axillaris*.
 6736. *Ichnanthus pallens*.
 6737. *Oryza sativa*.
 6738. *Arthrostylidium sarmentosum*.
 6739. *Paspalum orbiculatum*.
 6740. *Paspalum virgatum*.
 6741. *Paspalum portoricense*.
 6742. *Lasiacis harrisii*.
 6743. *Oplismenus hirtellus*.
 6744. *Panicum ghiesbreghtii*.
 6745. *Panicum schiffneri*.
 6746. *Imperata contracta*.
 6747. *Lasiacis ligulata*.
 6748. *Panicum trichanthum*.
 6749. *Arthrostylidium sarmentosum*.
 6750. *Isachne angustifolia*.
 6751. *Arthrostylidium multispicatum*.
 6752. *Panicum acuminatum*.
 6753. *Panicum laxum*.
 6754. *Bouteloua americana*.
 6755. *Syntherisma sanguinalis*.
 6756. *Paspalum glabrum*.
 6757. *Sporobolus virginicus*.
 6758. *Holcus sorghum*.
 6759. *Paspalum glabrum*.
 6760. *Lasiacis sorghoidea*.
 6761. *Paspalum millegrana*.
 6762. *Eriochrysis cayennensis*.
 6763. *Panicum parvifolium*.
 6764. *Axonopus aureus*.
 6765. *Panicum acuminatum*.
 6766. *Panicum chrysopsidifolium*.
 6767. *Panicum polycaulon*.
 6768. *Andropogon virgatus*.
 6769. *Panicum stenodes*.
 6770. *Panicum leucothrix*.
 6771. *Andropogon semiberbis*.
 6772. *Andropogon brevifolius*.
 6773. *Sorghastrum parviflorum*.
 6774. *Ichnanthus pallens*.
 6775. *Panicum laxum*.
 6775½. *Paspalum millegrana*.
 6776. *Andropogon leucostachyus*.
 6777. *Paspalum plicatulum*.
 6778. *Panicum aquaticum*.
 6779. *Paspalum notatum*.
 6780. *Hymenachne amplexicaulis*.
 6781. *Homalocenchrus hexandrus*.
 6782. *Lasiacis divaricata*.
 6783. *Panicum portoricense*.
 6784. *Syntherisma panicea*.
 6785. *Paspalum millegrana*.
 6786. *Panicum parvifolium*.
 6787. *Paspalum secans*.
 6788. *Panicum parvifolium*.
 6789. *Gymnopogon foliosus*.
 6790. *Eragrostis ciliaris*.
 6791. *Paspalum densum*.
 6792. *Paspalum virgatum*.
 6793. *Paspalum millegrana*.
 6794. *Paspalum millegrana*.
 6795. *Eriochloa subglabra*.
 6796. *Panicum parvifolium*.
 6797. *Homalocenchrus hexandrus*.
 6798. *Eragrostis elliotii*.
 6799. *Homalocenchrus hexandrus*.
 6800. *Chaetochloa magna*.
 6801. *Sacciolepis striata*.
 6802. *Panicum condensum*.
 6803. *Arundo donax*.
 6804. *Panicum aquaticum*.
 6805. *Ichnanthus pallens*.
 6806. *Syntherisma panicea*.
 6807. *Andropogon semiberbis*.
 6808. *Andropogon fastigiatus*.
 6809. *Lasiacis sorghoidea*.
 6810. *Leptocoryphium lanatum*.
 6811. *Paspalum leoninum*.
 6812. *Aristida portoricensis*.
 6813. *Paspalum leoninum*.
 6814. *Lasiacis divaricata*.
 6815. *Arundinella confinis*.

6816. *Andropogon gracilis*.
6817. *Andropogon saccharoides*.
6818. *Andropogon semiberbis*.
6819. *Andropogon leucostachyus*.
6820. *Paspalum portoricense*.
6821. *Holcus sorghum*.
6822. *Lasiacis sorghoidea*.
6823. *Lasiacis sorghoidea*.
6824. *Lasiacis sloanei*.
6825. *Lasiacis sloanei*.
6826. *Melinis minutiflora*.

CHRIST, H.¹

1800. *Paspalum heterotrichon*.
1850. *Panicum acuminatum*.
1898. *Lasiacis divaricata*.
2089. *Pharus glaber*.
2158. *Andropogon semiberbis*.
2185. *Paspalum virgatum*.

CLEMENTE, BROTHER.

2427. *Paspalum unispicatum*.
3442. *Cenchrus viridis*.

COWELL, J. F.

522. *Panicum trichoides*.
583. *Panicum trichoides*.
628. *Ichnanthus pallens*.
13334. *Tricholaena rosea*.

COWGILL, H. B.

106. *Coix lachryma-jobi*.
239. *Hymenachne amplexicaulis*.
423. *Paspalum plicatulum*.
611. *Oryza sativa*.
627. *Paspalum decumbens*.
648. *Lasiacis divaricata*.
684. *Eragrostis tephrosanthos*.
685. *Dactyloctenium aegyptium*.
686. *Andropogon leucostachyus*.
687. *Sorghastrum parviflorum*.
689. *Capriola dactylon*.
690. *Eragrostis tephrosanthos*.
691. *Paspalum millegrana*.
694. *Echinochloa colonum*.
695. *Paspalum virgatum*.
696. *Sorghastrum parviflorum*.

CRUEGER, H.

20. *Panicum cyanescens*.
43. *Thrasya paspaloides*.
74. *Ichnanthus pallens*.
77. *Ichnanthus ichnodes*.
78. *Ichnanthus nemoralis*.
82 (in part). *Ichnanthus nemoralis*.
82 (in part). *Arthrostylidium excelsum*.
84. *Panicum milleflorum*.
85. *Panicum frondescens*.
88. *Leptochloa virgata*.
89. *Gymnopogon spicatus*.
224. *Panicum parvifolium*.

CURTISS, A. H.

3. *Paspalum fimbriatum*.
67. *Chloris paraguayensis*.
72. *Chloris ciliata*.
75. *Aristida scabra*.
76. *Eragrostis ciliaris*.
80. *Chloris polydactyla*.
81. *Chloris sagraeana*.
94. *Arthrostylidium capillifolium*.
110. *Axonopus compressus*.
113. *Panicum adspersum*.
115. *Panicum barbinode*.
124. *Panicum maximum*.
131. *Uniola virgata*.
152. *Andropogon gracilis*.
156. *Paspalum glabrum*.
165. *Paspalum simpsoni*.
174. *Panicum condensum*.
175. *Panicum geminatum*.
177. *Panicum dichotomiflorum*.
192. *Paspalum conjugatum*.
236. *Achlaena piptostachya*.
267. *Panicum cayennense*.
268. *Oplismenus hirtellus*.
293. *Olyra latifolia*.
294 (in part). *Andropogon glomeratus*.
294 (in part). *Andropogon bicornis*.
304. *Sacciolepis vilvoides*.
305. *Panicum pilosum*.
306. *Axonopus compressus*.
307. *Panicum acuminatum*.
314. *Andropogon selloanus*.
323. *Sporobolus indicus*.

¹ These specimens, collected in Haiti, were received from Dr. I. Urban, the labels reading "leg. Christ."

327. *Paspalum decumbens*.
 328. *Panicum acuminatum*.
 371. *Reynaudia filiformis*.
 374. *Paspalum filiforme*.
 375. *Paspalum rottboellioides*.
 379. *Paspalum neesii*.
 380. *Andropogon gracilis*.
 382. *Andropogon saccharoides*.
 384. *Panicum diffusum*.
 391. *Eragrostis hypnoides*.
 393. *Leptocoryphium lanatum*.
 396. *Mesosetum loliiforme*.
 406. *Panicum fusiforme*.
 420. *Eragrostis cubensis*.
 427. *Echinochloa colonum*.
 428. *Sacciolepis myuros*.
 460. *Andropogon virgatus*.
 461. *Paratheria prostrata*.
 464. *Panicum boliviense*.
 493. *Ryttilix granularis*.
 494. *Panicum diffusum*.
 497. *Reimarochloa brasiliensis*.
 501. *Paspalum virgatum*.
 508. *Leptochloa filiformis*.
 511. *Axonopus compressus*.
 520. *Lasiacis compacta*.
 521. *Syntherisma simpsoni*.
 523. *Paspalum lindenianum*.
 530. *Andropogon brevifolius*.
 533. *Ischaemum rugosum*.
 536. *Panicum reptans*.
 546 (in part). *Bouteloua americana*.
 546 (in part). *Bouteloua heterostega*.
 561. *Holcus halepensis*.
 571. *Opizla stolonifera*.
 584. *Chloris cruciata*.
 593. *Oplismenus hirtellus*.
 598. *Panicum trichanthum*.
 600. *Chloris ciliata*.
 606. *Axonopus compressus*.
 607. *Leptochloa virgata*.
 636. *Dactyloctenium aegyptium*.
 655. *Syntherisma sanguinalis*.
 661. *Lithachne pauciflora*.
 662. *Arundinella deppeana*.
 691. *Panicum reptans*.
 693. *Chaetochloa verticillata*.
 714. *Panicum trichoides*.
 748. *Panicum adspersum*.
 749. *Chaetochloa geniculata*.

751. *Paspalum vaginatum*.
 764. *Paspalum distichum*.

DASH, J. S.¹

255. *Anatherum zizanioides*.
 259. *Panicum maximum*.
 267. *Sporobolus indicus*.
 346. *Pennisetum setosum*.
 584. *Paspalum glabrum*.
 602. *Eriochloa punctata*.
 603. *Chaetochloa onurus*.

DEWEY, L. H.

570. *Uniola paniculata*.

DUSS, PÉRE.

3. *Eragrostis purpurascens*.
 531. *Leptochloa virgata*.
 532. *Leptochloa filiformis*.
 533. *Themeda quadrivalvis*.
 536. *Panicum diffusum*.
 537. *Panicum fasciculatum*.
 538. *Panicum fasciculatum*.
 539. *Panicum barbinode*.
 540. *Eriochloa punctata*.
 542 (in part). *Echinochloa sabulicola*.
 542 (in part). *Echinochloa spectabilis*.
 544. *Chaetochloa barbata*.
 545 (in part). *Paspalum distichum*.
 545 (in part). *Paspalum vaginatum*.
 548. *Paspalum plicatulum*.
 548½. *Paspalum glabrum*.
 549. *Paspalum paniculatum*.
 551. *Paspalum glabrum*.
 558. *Paspalum notatum*.
 559. *Arundinella confinis*.
 563. *Arthrostylidium obtusatum*.
 564. *Arundo donax*.
 565. *Eragrostis prolifera*.
 566. *Eragrostis amabilis*.
 567. *Eragrostis amabilis*.
 720. *Paspalum plicatulum*.
 733. *Lithachne pauciflora*.
 740. *Eragrostis ciliaris laxa*.
 770. *Lasiacis sorghoidea*.

¹These are specimens collected by Dash and distributed from the Barbados Botanic Station. Other specimens distributed by the station but with no collector given are listed under Barbados.

772. *Ichnanthus pallens*.
 776. *Axonopus compressus*.
 778. *Oplismenus hirtellus*.
 778b. *Oplismenus setarius*.
 780. *Pharus glaber*.
 781. *Pharus latifolius*.
 782. *Chloris paraguayensis*.
 783. *Capriola dactylon*.
 784. *Andropogon salzmanni*.
 790. *Cenchrus viridis*.
 791. *Cenchrus echinatus*.
 793. *Eragrostis tephrosanthos*.
 1270. *Eleusine indica*.
 1272. *Chloris radiata*.
 1273. *Chloris ciliata*.
 1275. *Paspalum fimbriatum*.
 1276. *Paspalum conjugatum*.
 1277. *Sporobolus virginicus*.
 1278. *Sporobolus berterianus*.
 1279. *Sporobolus indicus*.
 1280. *Coix lachryma-jobi*.
 1283. *Phragmites phragmites*.
 1284. *Gynerium sagittatum*.
 1285. *Bambos vulgaris*.
 1288. *Panicum maximum*.
 1290. *Panicum reptans*.
 1293. *Panicum geminatum*.
 1295. *Rytilix granularis*.
 1297. *Andropogon condensatus*.
 1301. *Andropogon glomeratus*.
 1302. *Andropogon bicornis*.
 1303. *Anatherum zizanioides*.
 1305. *Eragrostis ciliaris laxa*.
 1306. *Imperata contracta*.
 1307. *Eragrostis ciliaris laxa*.
 1311. *Isachne disperma*.
 1312. *Isachne rigidifolia*.
 1315. *Chaetochloa italica*.
 1316. *Pennisetum setosum*.
 1317. *Paspalum saccharoides*.
 1318. *Valota insularis*.
 1321. *Panicum trichoides*.
 1322. *Echinochloa colonum*.
 1323. *Syntherisma digitata*.
 1324. *Stenotaphrum secundatum*.
 1326. *Bouteloua americana*.
 1329. *Pappophorum alopecuroides*.
 2673. *Paspalum plicatulum*.
 2677. *Paspalum paniculatum*.
 2678. *Axonopus compressus*.
 2681. *Panicum trichoides*.
 2684. *Echinochloa colonum*.
 2686. *Ichnanthus pallens*.
 2689. *Panicum barbinode*.
 2690. *Panicum geminatum*.
 2691. *Panicum fasciculatum*.
 2692. *Syntherisma sanguinalis*.
 2693. *Syntherisma digitata*.
 2694. *Chaetochloa geniculata*.
 2696. *Ischaemum latifolium*.
 2698. *Chaetochloa setosa*.
 2700. *Pharus latifolius*.
 2702. *Coix lachryma-jobi*.
 2704. *Eleusine indica*.
 2705. *Isachne angustifolia*.
 2706. *Eragrostis ciliaris*.
 2707. *Eragrostis ciliaris*.
 2708. *Chloris radiata*.
 2709. *Eriochloa punctata*.
 2711. *Dactyloctenium aegyptium*.
 2712. *Arthraxon quartinianus*.
 2714. *Oplismenus setarius*.
 2716. *Leptochloa virgata*.
 2717. *Antheophora hermaphrodita*.
 2718. *Cenchrus viridis*.
 2719. *Andropogon gracilis*.
 3136. *Arthraxon quartinianus*.
 3137. *Heteropogon contortus*.
 3138. *Gynerium sagittatum*.
 3140. *Sporobolus littoralis*.
 3141. *Sporobolus berterianus*.
 3141b. *Sporobolus indicus*.
 3142. *Eragrostis prolifera*.
 3143. *Eragrostis pilosa*.
 3143b. *Eragrostis amabilis*.
 3147. *Olyra latifolia*.
 3148. *Lithachne pauciflora*.
 3150. *Pharus glaber*.
 3151. *Stenotaphrum secundatum*.
 3158. *Chloris paraguayensis*.
 3158b. *Chloris ciliata*.
 3159. *Aristida adscensionis*.
 3161. *Echinochloa sabulicola*.
 3162. *Spartina patens juncea*.
 3164. *Pappophorum alopecuroides*.
 3171. *Andropogon salzmanni*.
 3172. *Rytilix granularis*.
 3175 (in part). *Chaetochloa barbata*.
 3175 (in part). *Echinochloa pyramidalis*.
 3176. *Echinochloa pyramidalis*.
 3177. *Panicum utowanaeum*.
 3178. *Panicum dichotomiflorum*.
 3179. *Panicum laxum*.
 3180. *Panicum adpersum*.
 3183. *Lasiacis sorghoidea*.

3184. *Panicum ghiesbreghtii*.
 3185. *Chaetochloa palmifolia*.
 3186. *Panicum maximum*.
 3188. *Chaetochloa setosa*.
 3189. *Isachne disperma*.
 3190. *Isachne rigidifolia*.
 3366. *Paspalum saccharoides*.
 3421. *Arundo donax*.
 3422. *Eragrostis prolifera*.
 3522. *Orthoclada laxa*.
 3529. *Panicum reptans*.
 3548. *Andropogon glomeratus*.
 3584. *Panicum geminatum*.
 3592. *Syntherisma sanguinalis*.
 3609. *Paspalum distichum*.
 3613. *Lasiacis sorghoidea*.
 3678 (in part). *Andropogon nodosus*.
 3678 (in part). *Andropogon caricosus*.
 3807. *Leptochloa filiformis*.
 3817. *Andropogon condensatus*.
 3826. *Oplismenus hirtellus*.
 3886. *Imperata contracta*.
 3915. *Paspalum olivaceum*.
 3917. *Panicum hirsutum*.
 3918. *Chaetochloa magna*.
 3919. *Panicum condensum*.
 3920. *Echinochloa pyramidalis*.
 3937. *Andropogon glomeratus*.
 3978. *Arthrostylidium excelsum*.
 4011. *Paspalum plicatulum*.
 4012. *Paspalum olivaceum*.
 4014. *Leptochloa virgata*.
 4015. *Chloris paraguayensis*.
 4017. *Pennisetum setosum*.
 4021. *Homalocenchrus hexandrus*.
 4022. *Andropogon salzmanni*.
 4023. *Eragrostis ciliaris laxa*.
 4024. *Eragrostis ciliaris*.
 4025. *Eragrostis prolifera*.
 4026. *Andropogon condensatus*.
 4035. *Phragmites phragmites*.
 4041. *Eragrostis pilosa*.
 4056. *Oplismenus hirtellus*.
 4059. *Paspalum nutans*.
 4110. *Chloris sagraeana*.
 4111. *Capriola dactylon*.
 4122. *Bambos vulgaris*.
 4152. *Pennisetum setosum*.
 4153. *Arundinella confinis*.
 4154. *Panicum pilosum*.
 4224. *Paspalum densum*.
 4507. *Paspalum orbiculatum*.
 4508. *Sporobolus muralis*.

4712. *Eragrostis pilosa*.
 4723. *Themeda quadrivalvis*.
 5157. *Chloris radiata*.

EARLE, F. S.

650. *Eragrostis cubensis*.
 682. *Leptocoryphium lanatum*.

EARLE, F. S., AND BAKER, C. F.

2455. *Panicum reptans*.

EARLE, F. S., AND WILSON, P.

343. *Panicum laxum*.
 1637. *Andropogon gracilis*.

EGGERS, H. F. A.

3. *Valota eggertii*.
 4. *Paspalum plicatulum*.
 232. *Syntherisma sanguinalis*.
 292. *Lasiacis divaricata*.
 293. *Panicum reptans*.
 295. *Valota eggertii*.
 469. *Cenchrus echinatus*.
 602. *Imperata contracta*.
 658. *Hymenachne amplexicaulis*.
 666. *Sacciolepis striata*.
 676. *Paspalum millegrana*.
 685. *Echinochloa sabulicola*.
 691. *Paspalum vaginatum*.
 708. *Chloris petraea*.
 709. *Chaetochloa magna*.
 712. *Phragmites phragmites*.
 795. *Paspalum paniculatum*.
 1056. *Isachne disperma*.
 1057. *Paspalum paniculatum*.
 1074. *Trachypogon plumosus*.
 1081. *Panicum pilosum*.
 1172. *Ichnanthus pallens*.
 1176. *Paspalum virgatum*.
 1182. *Gynerium sagittatum*.
 1195. *Phragmites phragmites*.
 1207. *Eragrostis hypnoides*.
 1226. *Panicum maximum*.
 1327. *Chaetochloa geniculata*.
 1328. *Panicum barbinode*.
 1329. *Panicum laxum*.
 1379. *Trachypogon plumosus*.
 1399. *Orthoclada laxa*.
 1961. *Syntherisma digitata*.

1964. *Paspalum conjugatum*.
 2129. *Panicum xalapense*.
 2139. *Eragrostis tephrosanthos*.
 2227b. *Danthonia domingensis*.
 2321 (in part). *Andropogon gracilis*.
 2321 (in part). *Andropogon leucostachyus*.
 2361. *Uniola virgata*.
 2378. *Chaetochloa setosa*.
 2380. *Lasiacis divaricata*.
 2439. *Paspalum pulchellum*.
 2466. *Olyra latifolia*.
 2517. *Uniola virgata*.
 2547. *Paspalum plicatulum*.
 2566. *Eragrostis hypnoides*.
 2574. *Stenotaphrum secundatum*.
 2781. *Syntherisma sanguinalis*.
 3003. *Aristida adscensionis*.
 3068. *Panicum diffusum*.
 3121. *Lasiacis harrisii*.
 3299. *Cenchrus echinatus*.
 3312a. *Leptochloa virgata*.
 3319. *Tripsacum dactyloides*.
 3514. *Arundinella confinis*.
 3579. *Senites zeugites*.
 3583. *Isachne arundinacea*.
 3724. *Chloris cruciata*.
 3978. *Panicum exiguiflorum*.
 3980. *Cenchrus echinatus*.
 4092. *Chloris petraea*.
 4119. *Uniola paniculata*.
 4333. *Uniola virgata*.
 4405. *Panicum dichotomiflorum*.
 4444. *Andropogon gracilis*.
 4447. *Aristida gyrans*.
 4466. *Olyra latifolia*.
 4512. *Panicum dichotomiflorum*.
 4655. *Oplismenus hirtellus*.
 4678. *Holcus halepensis*.
 4690. *Syntherisma digitata*.
 4708. *Pharus glaber*.
 4814. *Ichnanthus pallens*.
 4834. *Leptochloa fascicularis*.
 4870. *Panicum barbinode*.
 4875. *Panicum fasciculatum*.
 4939. *Pharus parvifolius*.
 4963. *Gynerium sagittatum*.
 5317. *Paspalum paniculatum*.
 5346. *Panicum reptans*.
 5349. *Leptochloa domingensis*.
 5350. *Panicum trichanthum*.
 5356. *Lithachne pauciflora*.
 5404a. *Homalocenchrus monandrus*.

5406. *Panicum ghiesbreghtii*.
 5534. *Panicum pilosum*.
 5549. *Olyra latifolia*.
 5553. *Paspalum virgatum*.
 5650. *Bouteloua americana*.
 5654. *Andropogon pertusus panormitanus*.
 5682. *Chaetochloa palmifolia*.
 5685. *Ichnanthus pallens*.
 5743. *Chloris radiata*.
 5752. *Axonopus compressus*.
 5810. *Panicum zizanioides*.
 5987. *Panicum trichoides*.
 6224. *Lasiacis sorghoidea*.
 6544. *Andropogon brevifolius*.
 6546. *Lasiacis sloanei*.
 6560. *Ichnanthus pallens*.
 6577. *Andropogon condensatus*.
 6582. *Holcus sorghum sudanensis*.
 6710. *Ischaemum latifolium*.
 6831. *Coix lachryma-jobi*.
 7128. *Chaetochloa barbata*.
 7186. *Ichnanthus pallens*.
 7252. *Sporobolus littoralis*.

ELLIOTT, W. R.

138. *Bouteloua americana*.

FAWCETT, W.

9226. *Bambusa nana*.

FINLAY.

39. *Paspalum decumbens*.

FISHER, M. J.

15. *Eragrostis tephrosanthos*.
 32. *Paspalum millegrana*.
 38. *Eragrostis tephrosanthos*.
 57. *Dactyloctenium aegyptium*.
 58. *Eleusine indica*.
 59. *Panicum fasciculatum*.
 60. *Echinochloa colonum*.
 61. *Leptochloa filiformis*.
 62. *Eragrostis tephrosanthos*.
 63. *Chloris radiata*.

FISHLOCK, W. C.

64. *Coix lachryma-jobi*.
 65. *Echinochloa colonum*.

FREDHOLM, A.

- 3061. *Cenchrus echinatus*.
- 3067. *Stenotaphrum secundatum*.
- 3131. *Coix lachryma-jobi*.
- 3134. *Rytidix granularis*.
- 3193. *Lithachne pauciflora*.
- 3196. *Oplismenus setarius*.
- 3282. *Panicum trichoides*.
- 3284. *Paspalum fimbriatum*.
- 3285. *Chloris radiata*.
- 3291. *Andropogon glomeratus*.
- 3299. *Paspalum virgatum*.
- 3305. *Chloris petraea*.
- 3306. *Paspalum conjugatum*.
- 3307. *Eleusine indica*.
- 3315. *Chaetochloa geniculata*.
- 3316. *Sporobolus indicus*.
- 3319. *Panicum maximum*.
- 3333. *Andropogon virginicus*.
- 3334. *Andropogon leucostachyus*.
- 3341. *Eragrostis ciliaris*.

FUERTES, M.

- 43. *Panicum adspersum*.
- 567. *Pharus glaber*.
- 614. *Pharus latifolius*.
- 808. *Uniola virgata*.
- 908. *Chloris ciliata*.
- 1261. *Sporobolus indicus*.
- 1263. *Cenchrus echinatus*.
- 1274. *Echinochloa colonum*.
- 1275. *Sporobolus indicus*.
- 1276. *Lasiacis divaricata*.
- 1278. *Eleusine indica*.
- 1279. *Holcus sorghum sudanensis*.
- 1280. *Chaetochloa geniculata*.
- 1281. *Andropogon glomeratus*.
- 1282. *Oplismenus hirtellus*.
- 1283. *Leptochloa domingensis*.
- 1284. *Panicum distantiflorum*.
- 1289. *Syntherisma sanguinalis*.
- 1291. *Sporobolus argutus*.
- 1365. *Holcus sorghum sudanensis*.
- 1376. *Bouteloua americana*.
- 1377. *Panicum reptans*.
- 1378. *Chaetochloa setosa*.
- 1417. *Panicum reptans*.
- 1418. *Heteropogon contortus*.
- 1419. *Echinochloa spectabilis*.
- 1420. *Andropogon urbanianus*.
- 1421. *Chloris leptantha*.
- 1422. *Valota insularis*.
- 1423. *Scutachne dura*.

- 1424. *Tripsacum dactyloides*.
- 1426. *Scutachne dura*.
- 1427. *Panicum distantiflorum*.
- 1428. *Leptochloa domingensis*.
- 1455b. *Heteropogon contortus*.
- 1729. *Isachne rigidifolia*.
- 1776. *Danthonia domingensis*.
- 1783. *Agrostis perennans*.
- 1846. *Paspalum plicatulum*.
- 1876. *Chaetochloa geniculata*.
- 1886. *Andropogon semiberbis*.

GEOGRAPHICAL SOCIETY OF BALTIMORE.

- 4. *Distichlis spicata*.
- 7. *Uniola virgata*.
- 46. *Arthrostyidium capillifolium*.
- 95. *Sporobolus indicus*.
- 96. *Stenotaphrum secundatum*.
- 97. *Capriola dactylon*.
- 99. *Chloris petraea*.
- 101. *Cenchrus carolinianus*.
- 109. *Uniola paniculata*.
- 197. *Paspalum glabrum*.
- 260. *Sporobolus domingensis*.
- 261. *Chloris petraea*.
- 262. *Chloris polydactyla*.
- 263. *Chaetochloa geniculata*.
- 266. *Sporobolus berterianus*.
- 267. *Paspalum glabrum*.
- 285. *Eleusine indica*.
- 301. *Uniola virgata*.
- 338. *Panicum maximum*.
- 346. *Sporobolus virginicus*.
- 349. *Uniola virgata*.
- 389. *Sporobolus virginicus*.
- 415. *Spartina patens juncea*.
- 439. *Sporobolus virginicus*.
- 479. *Paspalum distichum*.
- 489. *Panicum dichotomiflorum*.
- 491. *Distichlis spicata*.
- 522. *Chaetochloa setosa*.
- 527. *Sporobolus virginicus*.
- 542. *Andropogon semiberbis*.
- 546. *Paspalum vaginatum*.
- 547. *Sporobolus virginicus*.
- 550. *Sporobolus indicus*.
- 569. *Andropogon virginicus*.
- 570. *Syntherisma sanguinalis*.

GLASGOW, C. A.

- 1. *Sporobolus indicus*.
- 3. *Paspalum conjugatum*.

4. *Eragrostis ciliaris*.
5. *Chaetochloa geniculata*.
6. *Sporobolus muralis*.
7. *Eleusine indica*.
8. *Chloris radiata*.
9. *Paspalum distichum*.
10. *Chaetochloa barbata*.
11. *Leptochloa filiformis*.
13. *Axonopus compressus*.
15. *Syntherisma sanguinalis*.

GOLL, P. P.

19. *Chloris radiata*.
20. *Eleusine indica*.
22. *Sporobolus berterioanus*.
23. *Eriochloa subglabra*.
28. *Chaetochloa geniculata*.
31. *Panicum maximum*.
136. *Ichnanthus pallens*.
186. *Echinochloa colonum*.
227. *Lasiacis divaricata*.
235. *Paspalum plicatulum*.
236. *Chaetochloa geniculata*.
316. *Coix lachryma-jobi*.
326. *Andropogon leucostachyus*.
385. *Panicum fasciculatum*.
387. *Andropogon bicornis*.
397. *Andropogon bicornis*.
398. *Sporobolus berterioanus*.
473. *Eragrostis tephrosanthos*.
479. *Valota insularis*.
511. *Cenchrus echinatus*.
588. *Panicum fasciculatum*.
613. *Panicum barbinode*.
623. *Oplismenus hirtellus*.
658. *Eleusine indica*.
660. *Echinochloa colonum*.
662. *Panicum reptans*.
699. *Lasiacis divaricata*.
778. *Arundo donax*.
846. *Homalocenchrus hexandrus*.
878. *Echinochloa colonum*.
884. *Ichnanthus pallens*.
923. *Paspalum millegrana*.
984. *Coix lachryma-jobi*.

GOUIN.

59. *Trachypogon gouini*.

GUNDLACH, J.

1259. *Imperata contracta*.

HAHN, L.

163. *Leptochloa virgata*.
476. *Eragrostis ciliaris*.
479. *Rytilix granularis*.
616. *Panicum schiffneri*.
683. *Sporobolus indicus*.
690. *Andropogon condensatus*.
695. *Eleusine indica*.
696. *Chloris radiata*.
830. *Gynerium sagittatum*.
921. *Valota insularis*.
1012. *Pennisetum setosum*.
1047. *Panicum trichoides*.
1060. *Paspalum virgatum*.
1105. *Syntherisma digitata*.
1259. *Hymenachne amplexicaulis*.
1381. *Dactyloctenium aegyptium*.
1435. *Isachne rigidifolia*.
1527. *Syntherisma digitata*.

HARRIS, W.

424. *Oplismenus setarius*.
6633. *Coix lachryma-jobi*.
6740. *Dactyloctenium aegyptium*.
6826. *Oplismenus setarius*.
6845. *Panicum reptans*.
6873. *Chloris radiata*.
9049. *Chloris paraguayensis*.
9297. *Chaetochloa setosa*.
9497. *Paspalum notatum*.
9499. *Anthoxanthum odoratum*.
9503. *Andropogon gracilis*.
9504. *Festuca bromoides*.
9541. *Eragrostis ciliaris*.
9542. *Aristida cognata*.
9622. *Andropogon gracilis*.
9665. *Chloris polydactyla*.
9673. *Chaetochloa onurus*.
9682. *Sporobolus indicus*.
9739. *Chaetochloa scandens*.
9777. *Pharus glaber*.
9929. *Hymenachne amplexicaulis*.
10112. *Poa annua*.
10893. *Bambos nana*.
10902. *Chaetochloa geniculata*.
10906. *Poa annua*.
10907. *Briza minor*.
10909. *Briza maxima*.
10910. *Arthraxon quartinianus*.
10911. *Chaetochloa palmifolia*.
10912. *Andropogon bicornis*.

10914. *Danthonia shrevei*.
 10916. *Bromus sterilis*.
 10917. *Festuca bromoides*.
 10919. *Bromus unioloides*.
 10920. *Poa annua*.
 10930. *Panicum barbinode*.
 11109. *Panicum acuminatum*.
 11149. *Paspalum densum*.
 11156. *Chaetochloa geniculata*.
 11157. *Chaetochloa scandens*.
 11163. *Panicum chrysopsidifolium*.
 11170. *Panicum rudgei*.
 11235. *Holcus halepensis*.
 11236. *Antheophora harmaphrodita*.
 11237. *Cenchrus viridis*.
 11238. *Leptochloa filiformis*.
 11239. *Cenchrus echinatus*.
 11240. *Chloris radiata*.
 11241. *Echinochloa colonum*.
 11242. *Eragrostis ciliaris laxa*.
 11243 (in part). *Eragrostis ciliaris laxa*.
 11243 (in part). *Eragrostis amabilis*.
 11244. *Eleusine indica*.
 11245. *Valota insularis*.
 11246. *Sporobolus indicus*.
 11247. *Panicum adpersum*.
 11248. *Capriola dactylon*.
 11249. *Panicum maximum*.
 11250. *Bromus unioloides*.
 11251. *Syntherisma sanguinalis*.
 11252. *Panicum fasciculatum*.
 11253. *Oplismenus hirtellus*.
 11254. *Panicum barbinode*.
 11255. *Panicum fasciculatum*.
 11256. *Manisuris exaltata*.
 11257. *Leptochloa virgata*.
 11258. *Chloris paraguayensis*.
 11259. *Heteropogon contortus*.
 11260. *Lasiacis sloanei*.
 11261. *Leptochloa domingensis*.
 11262. *Andropogon pertusus*.
 11263. *Andropogon virginicus*.
 11264. *Panicum glutinosum*.
 11265. *Andropogon gracilis*.
 11266. *Poa annua*.
 11267. *Paspalum fimbriatum*.
 11268. *Andropogon virginicus*.
 11269. *Syntherisma longiflora*.
 11270. *Andropogon bicornis*.
 11271 (in part). *Syntherisma longiflora*.
 11271 (in part). *Syntherisma argyrotachya*.
 11272. *Chaetochloa lutescens*.
 11273. *Syntherisma sanguinalis*.
 11274. *Briza maxima*.
 11275. *Bromus sterilis*.
 11276. *Festuca bromoides*.
 11278. *Paspalum paniculatum*.
 11279. *Lithachne pauciflora*.
 11280a. *Panicum pilosum*.
 11281. *Sporobolus indicus*.
 11282. *Chaetochloa geniculata*.
 11283. *Syntherisma longiflora*.
 11284. *Paspalum plicatulum*.
 11285. *Panicum laxum*.
 11286. *Chaetochloa palmifolia*.
 11287. *Paspalum paniculatum*.
 11288. *Andropogon fastigiatus*.
 11289. *Paspalum plicatulum*.
 11290. *Heteropogon contortus*.
 11291. *Leptochloa domingensis*.
 11292. *Chaetochloa setosa*.
 11293. *Andropogon saccharoides*.
 11294. *Coix lachryma-jobi*.
 11295. *Andropogon virginicus*.
 11296. *Ichnanthus nemorosus*.
 11297. *Lasiacis divaricata*.
 11298. *Ichnanthus pallens*.
 11299. *Panicum trichoides*.
 11300. *Pennisetum orientale triflorum*.
 11301. *Chaetochloa setosa*.
 11302. *Anthoxanthum odoratum*.
 11303. *Chaetochloa setosa*.
 11304. *Dactyloctenium aegyptium*.
 11305. *Nazia aliena*.
 11306. *Sporobolus argutus*.
 11307. *Oplismenus setarius*.
 11308. *Paspalum conjugatum*.
 11310. *Sporobolus berterianus*.
 11311. *Cenchrus echinatus*.
 11312. *Uniola virgata*.
 11313. *Anatherum zizanioides*.
 11314. *Isachne pygmaea*.
 11315. *Panicum acuminatum*.
 11316. *Isachne rigens*.
 11317. *Eleusine indica*.
 11318. *Andropogon gracilis*.
 11319. *Pharus glaber*.
 11320. *Olyra latifolia*.
 11321. *Sporobolus argutus*.
 11322. *Nazia aliena*.
 11323. *Poa annua*.
 11324. *Panicum fasciculatum*.
 11325. *Lasiacis sloanei*.

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| 11326. <i>Homalocenchrus monandrus</i> . | 11386. <i>Axonopus compressus</i> . |
| 11327. <i>Senites zeugites</i> . | 11387. <i>Manisuris exaltata</i> . |
| 11328. <i>Panicum trichoides</i> . | 11388. <i>Sporobolus virginicus</i> . |
| 11329. <i>Eragrostis ciliaris</i> . | 11390. <i>Eragrostis pilosa</i> . |
| 11330. <i>Pharus glaber</i> . | 11391. <i>Festuca myurus</i> . |
| 11331. <i>Homalocenchrus monandrus</i> . | 11392. <i>Chloris cruciata</i> . |
| 11332. <i>Andropogon gracilis</i> . | 11393. <i>Chloris cruciata</i> . |
| 11333. <i>Isachne rigens</i> . | 11394. <i>Bouteloua americana</i> . |
| 11334. <i>Rytilix granularis</i> . | 11395. <i>Panicum glutinosum</i> . |
| 11335. <i>Eragrostis ciliaris</i> . | 11396. <i>Andropogon saccharoides</i> . |
| 11336. <i>Isachne rigens</i> . | 11397. <i>Pharus glaber</i> . |
| 11337. <i>Isachne arundinacea</i> . | 11398. <i>Lasiacis sorghoidea</i> . |
| 11338. <i>Andropogon gracilis</i> . | 11399. <i>Andropogon glomeratus</i> . |
| 11339. <i>Oplismenus setarius</i> . | 11400. <i>Panicum fasciculatum</i> . |
| 11341. <i>Chloris cruciata</i> . | 11407. <i>Dactyloctenium aegyptium</i> . |
| 11342. <i>Oplismenus setarius</i> . | 11408. <i>Paspalum caespitosum</i> . |
| 11343. <i>Panicum adpersum</i> . | 11409. <i>Valota insularis</i> . |
| 11344. <i>Andropogon fastigiatus</i> . | 11410. <i>Lasiacis sorghoidea</i> . |
| 11345. <i>Panicum fasciculatum</i> . | 11411. <i>Eragrostis tephrosanthos</i> . |
| 11346. <i>Olyra latifolia</i> . | 11412. <i>Andropogon gracilis</i> . |
| 11347. <i>Chloris paraguayensis</i> . | 11413. <i>Syntherisma argyrostachya</i> . |
| 11348. <i>Chaetochloa setosa</i> . | 11414. <i>Briza minor</i> . |
| 11349. <i>Andropogon leucostachyus</i> . | 11415. <i>Stenotaphrum secundatum</i> . |
| 11351. <i>Heteropogon contortus</i> . | 11416. <i>Arthraxon quartinianus</i> . |
| 11352. <i>Panicum geminatum</i> . | 11417. <i>Isachne rigens</i> . |
| 11353. <i>Paspalum plicatulum</i> . | 11418. <i>Senites zeugites</i> . |
| 11354. <i>Lasiacis harrisii</i> . | 11419. <i>Echinochloa colonum</i> . |
| 11355. <i>Chusquea abietifolia</i> . | 11420. <i>Panicum zizanioides</i> . |
| 11356. <i>Sporobolus virginicus</i> . | 11429. <i>Danthonia shrevei</i> . |
| 11357. <i>Leptothrium rigidum</i> . | 11431. <i>Senites zeugites</i> . |
| 11358. <i>Andropogon fastigiatus</i> . | 11432. <i>Isachne rigens</i> . |
| 11359. <i>Oplismenus hirtellus</i> . | 11433. <i>Pennisetum orientale triflorum</i> . |
| 11360. <i>Chaetochloa barbata</i> . | 11434. <i>Sporobolus purpurascens</i> . |
| 11361. <i>Chloris radiata</i> . | 11435. <i>Panicum acuminatum</i> . |
| 11362. <i>Andropogon virginicus</i> . | 11436. <i>Olyra latifolia</i> . |
| 11363. <i>Leptochloa filiformis</i> . | 11437. <i>Sorghastrum parviflorum</i> . |
| 11364. <i>Oplismenus hirtellus</i> . | 11438. <i>Poa annua</i> . |
| 11365. <i>Sporobolus purpurascens</i> . | 11439. <i>Andropogon tener</i> . |
| 11367. <i>Leptochloa domingensis</i> . | 11440. <i>Panicum glutinosum</i> . |
| 11369. <i>Bouteloua americana</i> . | 11442. <i>Eragrostis pilosa</i> . |
| 11370. <i>Andropogon gracilis</i> . | 11443. <i>Bouteloua americana</i> . |
| 11371. <i>Panicum acuminatum</i> . | 11444. <i>Panicum acuminatum</i> . |
| 11372. <i>Bouteloua americana</i> . | 11445. <i>Isachne rigens</i> . |
| 11373. <i>Dactyloctenium aegyptium</i> . | 11446. <i>Oplismenus setarius</i> . |
| 11374. <i>Eragrostis pilosa</i> . | 11448. <i>Paspalum conjugatum</i> . |
| 11375. <i>Chloris cruciata</i> . | 11449. <i>Andropogon saccharoides</i> . |
| 11378. <i>Andropogon virginicus</i> . | 11450. <i>Eragrostis tephrosanthos</i> . |
| 11379. <i>Paspalum paniculatum</i> . | 11451. <i>Bouteloua americana</i> . |
| 11380. <i>Chaetochloa scandens</i> . | 11452. <i>Arundinella confinis</i> . |
| 11382. <i>Chaetochloa geniculata</i> . | 11453. <i>Anthoxanthum odoratum</i> . |
| 11383. <i>Andropogon bicornis</i> . | 11454. <i>Lasiacis sloanei</i> . |
| 11384. <i>Eragrostis ciliaris laxa</i> . | 11455. <i>Bromus unioloides</i> . |
| 11385. <i>Panicum zizanioides</i> . | 11457. <i>Chaetochloa lutescens</i> . |

11458. *Chaetochloa setosa*.
 11459. *Homalocenchrus monandrus*.
 11461. *Pharus glaber*.
 11462. *Arundinella confinis*.
 11463. *Sorghastrum parviflorum*.
 11464. *Andropogon fastigiatus*.
 11465. *Oplismenus hirtellus*.
 11466. *Panicum laxum*.
 11467. *Lithachne pauciflora*.
 11468. *Isachne arundinacea*.
 11469. *Lasiacis sorghoidea*.
 11470. *Panicum fasciculatum*.
 11471. *Andropogon piptatherus*.
 11472. *Andropogon brevifolius*.
 11473. *Chloris ciliata*.
 11474. *Aristida adscensionis*.
 11475. *Valota insularis*.
 11476. *Ichnanthus nemorosus*.
 11477. *Nazia aliena*.
 11478. *Andropogon pertusus*.
 11479. *Chaetochloa setosa*.
 11480. *Aristida adscensionis*.
 11481. *Bouteloua americana*.
 11482. *Chloris paraguayensis*.
 11483. *Panicum molle*.
 11484. *Eragrostis pilosa*.
 11485. *Ichnanthus pallens*.
 11486. *Lasiacis divaricata*.
 11487. *Lasiacis harrisii*.
 11488. *Eragrostis pilosa*.
 11489. *Bromus sterilis*.
 11490. *Lasiacis divaricata*.
 11491. *Lasiacis divaricata*.
 11492. *Chloris radiata*.
 11493. *Eragrostis pilosa*.
 11494. *Panicum acuminatum*.
 11495. *Eragrostis ciliaris*.
 11496. *Poa annua*.
 11497. *Gynerium sagittatum*.
 11498. *Panicum adpersum*.
 11499. *Dactyloctenium aegyptium*.
 11500. *Aristida adscensionis*.
 11501. *Nazia aliena*.
 11502. *Chloris leptantha*.
 11503. *Sporobolus argutus*.
 11504. *Panicum molle*.
 11505. *Leptochloa virgata*.
 11506. *Chloris paraguayensis*.
 11507. *Andropogon fastigiatus*.
 11508. *Panicum glutinosum*.
 11509. *Festuca bromoides*.
 11510. *Dactyloctenium aegyptium*.
 11511. *Chaetochloa barbata*.
 11512. *Panicum adpersum*.
 11513. *Aristida adscensionis*.
 11514. *Andropogon pertusus*.
 11515. *Chloris leptantha*.
 11517. *Isachne arundinacea*.
 11518. *Holcus sorghum*.
 11519. *Arundinella confinis*.
 11520. *Eragrostis pilosa*.
 11521. *Holcus halepensis*.
 11522. *Paspalum decumbens*.
 11523. *Ichnanthus pallens*.
 11524. *Panicum pilosum*.
 11525. *Anthoxanthum odoratum*.
 11526. *Festuca bromoides*.
 11527. *Briza minor*.
 11528. *Lasiacis divaricata*.
 11529. *Isachne arundinacea*.
 11530. *Lasiacis divaricata*.
 11531. *Lasiacis sloanei*.
 11532. *Imperata contracta*.
 11533. *Arundinella confinis*.
 11534. *Paspalum paniculatum*.
 11535. *Chaetochloa palmifolia*.
 11536. *Arthraxon quartinianus*.
 11537. *Olyra latifolia*.
 11538. *Themeda arguens*.
 11539. *Panicum reptans*.
 11540. *Heteropogon contortus*.
 11541. *Eragrostis ciliaris*.
 11543. *Isachne rigens*.
 11544. *Paspalum notatum*.
 11545. *Paspalum decumbens*.
 11546. *Andropogon brevifolius*.
 11547. *Panicum pilosum*.
 11548. *Chloris radiata*.
 11549. *Ichnanthus pallens*.
 11550. *Arthraxon quartinianus*.
 11551. *Isachne arundinacea*.
 11552. *Lasiacis harrisii*.
 11553. *Poa annua*.
 11554. *Panicum acuminatum*.
 11555. *Andropogon brevifolius*.
 11557. *Anatherum zizanioides*.
 11558. *Andropogon piptatherus*.
 11559. *Bouteloua americana*.
 11560. *Eragrostis pilosa*.
 11561. *Paspalum paniculatum*.
 11562. *Anatherum zizanioides*.
 11563. *Arthraxon quartinianus*.
 11564. *Festuca myurus*.
 11565. *Panicum barbinode*.
 11566. *Panicum trichoides*.
 11567. *Isachne arundinacea*.

11568. *Sporobolus purpurascens*.
 11569. *Imperata contracta*.
 11570. *Paspalum notatum*.
 11572. *Andropogon brevifolius*.
 11576. *Phragmites phragmites*.
 11577. *Andropogon brevifolius*.
 11578. *Andropogon gracilis*.
 11579. *Anatherum zizanioides*.
 11581. *Isachne arundinacea*.
 11582. *Holcus halepensis*.
 11583. *Isachne arundinacea*.
 11584. *Senites zeugites*.
 11585. *Isachne rigens*.
 11587. *Lasiacis harrisii*.
 11591. *Festuca myurus*.
 11592. *Andropogon bicornis*.
 11593. *Lithachne pauciflora*.
 11594. *Danthonia shrevei*.
 11595. *Isachne rigens*.
 11596. *Senites zeugites*.
 11597. *Panicum acuminatum*.
 11598. *Sporobolus purpurascens*.
 11599. *Anthoxanthum odoratum*.
 11600. *Andropogon bicornis*.
 11601. *Leptochloa domingensis*.
 11602. *Chaetochloa barbata*.
 11603. *Briza minor*.
 11604. *Festuca myurus*.
 11606. *Paspalum decumbens*.
 11607. *Oplismenus hirtellus*.
 11609. *Sporobolus indicus*.
 11610. *Heteropogon contortus*.
 11611. *Sporobolus argutus*.
 11612. *Echinochloa colonum*.
 11613. *Axonopus compressus*.
 11614. *Syntherisma digitata*.
 11615. *Paspalum plicatulum*.
 11616. *Paspalum paniculatum*.
 11617. *Chaetochloa geniculata*.
 11618. *Eragrostis prolifera*.
 11619. *Sporobolus indicus*.
 11620. *Paspalum millegrana*.
 11621. *Briza maxima*.
 11622. *Uniola virgata*.
 11629. *Danthonia shrevei*.
 11630. *Valota insularis*.
 11635. *Sorghastrum parviflorum*.
 11640. *Paspalum conjugatum*.
 11641. *Paspalum repens*.
 11644. *Panicum laxum*.
 11645. *Paspalum distichum*.
 11654. *Chloris polydactyla*.
 11655. *Andropogon saccharoides*.
 11656. *Andropogon gracilis*.
 11657. *Chaetochloa onurus*.
 11660. *Imperata brasiliensis*.
 11661. *Eragrostis elliottii*.
 11664. *Eragrostis cubensis*.
 11691. *Panicum ghiesbreghtii*.
 11695. *Paspalum distachyon*.
 11700. *Festuca bromoides*.
 11706. *Cymbopogon citratus*.
 11708. *Arthraxon quartinianus*.
 11709. *Bambos vulgaris*.
 11713. *Leptochloa domingensis*.
 11714. *Panicum adpersum*.
 11715. *Eragrostis ciliaris*.
 11717. *Valota insularis*.
 11718. *Leptochloa domingensis*.
 11720. *Andropogon gracilis*.
 11734. *Eragrostis cubensis*.
 11735. *Sporobolus indicus*.
 11738. *Heteropogon contortus*.
 11742. *Imperata brasiliensis*.
 11743. *Chaetochloa geniculata*.
 11749. *Sacciolepis striata*.
 11750. *Panicum condensum*.
 11751. *Echinochloa sabulicola*.
 11779. *Dactylis glomerata*.
 11781. *Andropogon saccharoides*.
 11782. *Chaetochloa barbata*.
 11783. *Panicum geminatum*.
 11784. *Oplismenus hirtellus*.
 11785. *Panicum adpersum*.
 11786. *Pharus glaber*.
 11787. *Oplismenus hirtellus*.
 11788. *Homalocenchrus monandrus*.
 11789. *Panicum fasciculatum*.
 11800. *Panicum laxum*.
 11805. *Hymenachne amplexicaulis*.
 11806. *Echinochloa colonum*.
 11809. *Hymenachne amplexicaulis*.
 11812. *Paspalum repens*.
 11813. *Panicum elephantipes*.
 11818. *Panicum fasciculatum*.
 11819. *Syntherisma digitata*.
 11820. *Panicum fasciculatum*.
 11824. *Echinochloa sabulicola*.
 11832. *Lasiacis oaxacensis*.
 11836. *Panicum glutinosum*.
 11837. *Ichnanthus pallens*.
 11841. *Stenotaphrum secundatum*.
 11843. *Oplismenus setarius*.
 11847. *Paspalum fimbriatum*.
 11848. *Panicum fasciculatum*.
 11849. *Anthoxanthum odoratum*.
 11850. *Paspalum distichum*.

11863. *Antheophora hermaphrodita*.
 11909. *Eragrostis pilosa*.
 11940. *Hymenachne amplexicaulis*.
 12063. *Eragrostis pilosa*.
 12065. *Chaetochloa onurus*.
 12135. *Arundo donax*.
 12146. *Panicum trichoides*.
 12147. *Hackelochloa granularis*.
 12161. *Panicum ghiesbreghtii*.
 12163. *Scutachne dura*.
 12211. *Chloris leptantha*.
 12212. *Chloris leptantha*.
 12213. *Andropogon saccharoides*.
 12214. *Paspalum densum*.
 12221. *Panicum parvifolium*.
 12225. *Panicum polycaulon*.
 12226. *Panicum cayennense*.
 12227. *Panicum stenodes*.
 12228. *Panicum chrysopsidifolium*.
 12233. *Andropogon brevifolius*.
 12234. *Panicum fusiforme*.
 12235. *Panicum rudgei*.
 12244. *Andropogon leucostachyus*.
 12247. *Arundinella confinis*.
 12254. *Panicum pilosum*.
 12255. *Paspalum decumbens*.
 12258. *Ichnanthus pallens*.
 12282. *Paspalum conjugatum*.
 12307. *Panicum geminatum*.
 12309. *Leptochloa uninervia*.
 12311. *Leptochloa uninervia*.
 12317. *Paspalum caespitosum*.
 12425. *Oryza sativa*.
 12431. *Panicum glutinosum*.
 12433. *Aristida refracta*.
 12434. *Chloris sagraeana*.
 12435. *Eragrostis elliottii*.
 12437. *Eragrostis ciliaris*.
 12440. *Aristida cognata*.
 12441. *Eragrostis cubensis*.
 12443. *Paspalum notatum*.
 12447. *Leptochloa domingensis*.
 12450. *Homalocenchrus hexandrus*.
 12452. *Aristida adscensionis*.
 12454. *Chusquea abietifolia*.
 12455. *Anthoxanthum odoratum*.
 12457. *Andropogon bicornis*.
 12458. *Andropogon leucostachyus*.
 12460. *Andropogon piptatherus*.
 12461. *Themeda quadrivalvis*.
 12462. *Chloris orthonoton*.
 12463. *Sporobolus argutus*.
 12464. *Chloris petraea*.

12465. *Andropogon glomeratus*.
 12466. *Eragrostis prolifera*.
 12467. *Sporobolus argutus*.
 12468. *Sporobolus berterianus*.
 12469. *Paspalum millegrana*.
 12469a. *Paspalum secans*.
 12470. *Hymenachne amplexicaulis*.
 12472. *Ichnanthus pallens*.
 12476. *Chloris leptantha*.
 12477. *Chaetochloa setosa*.
 12480. *Isachne rigens*.
 12481. *Anthoxanthum odoratum*.
 12482. *Bromus unioloides*.
 12483. *Andropogon glomeratus*.
 12484. *Syntherisma longiflora*.
 12487. *Isachne arundinacea*.
 12488. *Lasiacis sorghoidea*.
 12489. *Isachne rigens*.
 12490. *Isachne pygmaea*.
 12491. *Isachne arundinacea*.
 12546. *Festuca bromoides*.

HARRIS, W., AND BRITTON, N. L.

10590. *Arundo donax*.

HARSHBERGER, J. W.

76. *Chloris paraguayensis*.

HART, J.

90. *Syntherisma digitata*.
 350a. *Bambos vulgaris*.
 559. *Bouteloua americana*.
 560. *Chloris paraguayensis*.
 566. *Bambos vulgaris*.
 567. *Paspalum fimbriatum*.
 570. *Andropogon saccharoides*.
 574. *Valota insularis*.
 576. *Cenchrus echinatus*.
 578. *Oplismenus setarius*.
 580. *Lasiacis divaricata*.
 582. *Sporobolus indicus*.
 677. *Paspalum paniculatum*.
 678. *Syntherisma sanguinalis*.
 679 (in part). *Eragrostis ciliaris*.
 679 (in part). *Paspalum plicatulum*.
 680. *Chloris cruciata*.
 681. *Festuca bromoides*.
 682 (in part). *Andropogon glomeratus*.
 682 (in part). *Andropogon bicornis*.
 683. *Chaetochloa geniculata*.

684. *Chaetochloa geniculata*.
 685. *Lasiacis sorghoidea*.
 686. *Eleusine indica*.
 687. *Paspalum fimbriatum*.
 688. *Syntherisma longiflora*.
 689. *Andropogon gracilis*.
 692. *Andropogon virginicus*.
 708. *Isachne arundinacea*.
 726. *Panicum zizanioides*.
 729. *Paspalum virgatum*.
 730. *Olyra latifolia*.
 732. *Panicum pilosum*.
 734. *Andropogon virginicus*.
 735. *Sporobolus purpurascens*.
 736. *Panicum acuminatum*.
 738. *Bromus sterilis*.
 739. *Lolium multiflorum*.
 740. *Chaetochloa lutescens*.
 741. *Bromus unioloides*.
 742. *Anthoxanthum odoratum*.
 743. *Festuca elatior*.
 744. *Dactylis glomerata*.
 745. *Paspalum paniculatum*.
 747. *Chaetochloa geniculata*.
 748. *Notholcus lanatus*.
 749. *Poa annua*.
 750. *Festuca bromoides*.
 751. *Briza minor*.
 754. *Andropogon gracilis*.
 755. *Paspalum conjugatum*.
 756. *Syntherisma longiflora*.
 774. *Sporobolus virginicus*.
 779. *Leptochloa virgata*.
 781. *Eragrostis ciliaris*.
 783. *Cenchrus viridis*.
 785. *Panicum fasciculatum*.
 789. *Senites zeugites*.
 792. *Panicum glutinosum*.
 796. *Chaetochloa scandens*.
 797. *Panicum maximum*.
 800. *Gynerium sagittatum*.
 806. *Panicum geminatum*.
 809. *Manisuris exaltata*.
 812. *Sorghastrum parviflorum*.
 813. *Lasiacis sorghoidea*.
 815. *Chaetochloa palmifolia*.
 818. *Sporobolus indicus*.
 825. *Echinochloa colonum*.
 826. *Chaetochloa setosa*.
 829. *Chaetochloa setosa*.
 831. *Andropogon virginicus*.
 833. *Axonopus compressus*.
 837. *Leptochloa virgata*.

838. *Panicum reptans*.
 840. *Panicum fasciculatum*.
 841. *Chloris cruciata*.
 860. *Paspalum vaginatum*.
 864. *Aristida cognata*.
 865. *Paspalum distichum*.
 869. *Andropogon glomeratus*.
 920. *Hymenachne amplexicaulis*.
 923. *Ichnanthus nemorosus*.
 927. *Agrostis alba*.
 929. *Chloris polydactyla*.
 1487. *Chaetochloa scandens*.
 1493. *Avena fatua*.
 1525. *Homalocenchrus monandrus*.
 2003. *Gynerium sagittatum*.
 2004. *Holcus halepensis*.
 2076. *Anthephora hermaphrodita*.
 2079. *Chloris petraea*.

HELLER, A. A.

12. *Panicum acuminatum*.
 92. *Ichnanthus pallens*.
 100. *Panicum barbinode*.
 101. *Eragrostis ciliaris*.
 107. *Syntherisma sanguinalis*.
 108. *Echinochloa colonum*.
 110. *Eleusine indica*.
 135. *Panicum fasciculatum*.
 136. *Valota insularis*.
 156. *Eragrostis ciliaris*.
 157. *Panicum trichoides*.
 164. *Paspalum glabrum*.
 165. *Anthephora hermaphrodita*.
 195. *Chloris radiata*.
 196. *Chloris radiata*.
 197. *Eragrostis tephrosanthos*.
 229. *Cymbopogon citratus*.
 329. *Chaetochloa geniculata*.
 343. *Lasiacis divaricata*.
 377. *Panicum maximum*.
 380. *Eriochloa subglabra*.
 387. *Panicum trichoides*.
 422. *Syntherisma sanguinalis*.
 497. *Panicum reptans*.
 522. *Panicum laxum*.
 524. *Paspalum portoricense*.
 528. *Coix lachryma-jobi*.
 531. *Panicum trichoides*.
 584. *Eragrostis elliotii*.
 597. *Andropogon bicornis*.
 625. *Paspalum virgatum*.
 639. *Panicum portoricense*.

649. *Eragrostis hypnoides*.
 650. *Valota insularis*.
 664. *Paspalum orbiculatum*.
 826. *Ichnanthus pallens*.
 913. *Bambos vulgaris*.
 933. *Andropogon leucostachyus*.
 934. *Arundinella confinis*.
 982. *Panicum chrysopsidifolium*.
 982b. *Panicum portoricense*.
 984. *Andropogon leucostachyus*.
 1275. *Sporobolus indicus*.
 1317. *Chloris petraea*.
 1341. *Stenotaphrum secundatum*.
 1346. *Cenchrus echinatus*.
 1348. *Antheophora hermaphrodita*.
 1373. *Paspalum virgatum*.
 1378. *Panicum laxum*.
 1412. *Sporobolus virginicus*.
 4355. *Arundinella confinis*.
 4368. *Paspalum millegrana*.
 4373. *Chaetochloa barbata*.
 4374. *Ichnanthus pallens*.
 4375. *Lasiacis sorghoidea*.
 4396. *Andropogon leucostachyus*.
 4397. *Paspalum conjugatum*.
 4398. *Syntherisma digitata*.
 4399. *Paspalum paniculatum*.
 4401. *Rytilix granularis*.
 4409. *Echinochloa colonum*.
 4410. *Eleusine indica*.
 4411. *Dactyloctenium aegyptium*.
 4417. *Chloris paraguayensis*.
 4443. *Olyra latifolia*.
 4479. *Ichnanthus axillaris*.
 4488. *Chaetochloa barbata*.
 4528. *Panicum fasciculatum*.
 4535. *Leptochloa scabra*.
 4583. *Olyra latifolia*.
 4590. *Sporobolus cubensis*.
 6057. *Bouteloua heterostega*.
 6075. *Coix lachryma-jobi*.
 6093. *Ichnanthus pallens*.
 6094. *Panicum trichoides*.
 6158. *Valota insularis*.
 6198. *Eragrostis tephrosanthos*.
 6218. *Eragrostis ciliaris*.
 6219. *Paspalum fimbriatum*.
 6226. *Panicum fasciculatum*.
 6227. *Paspalum paniculatum*.
 6230. *Andropogon brevifolius*.
 6240. *Chaetochloa geniculata*.
 6256. *Arundinella confinis*.
 6289. *Phragmites phragmites*.

6293. *Panicum barbinode*.
 6298. *Eriochloa punctata*.
 6302. *Panicum fasciculatum*.
 6303. *Oplismenus hirtellus*.
 6354. *Paspalum decumbens*.
 6380. *Chloris radiata*.
 6404. *Eragrostis ciliaris*.
 6422. *Chloris petraea*.
 6442. *Panicum portoricense*.

Hess, W. E.

75. *Lasiacis sorghoidea*.
 107. *Oryza latifolia*.
 109. *Oryza latifolia*.
 116. *Chusquea abietifolia*.
 116½. *Arthrostylidium sarmentosum*.
 117. *Holcus halepensis*.
 118. *Cenchrus myosuroides*.
 120. *Eragrostis tephrosanthos*.
 121. *Capriola dactylon*.
 122. *Eriochloa punctata*.
 422. *Panicum utowanaeum*.
 423. *Sporobolus virginicus*.
 424. *Chaetochloa setosa*.
 425. *Paspalum glabrum*.
 426. *Chaetochloa setosa*.
 427. *Pappophorum alopecuroideum*.
 428. *Valota insularis*.
 429. *Lasiacis divaricata*.
 430. *Chloris paraguayensis*.
 431. *Panicum utowanaeum*.
 432. *Syntherisma digitata*.
 433. *Valota insularis*.
 434. *Paspalum glabrum*.
 435. *Paspalum caespitosum*.
 436. *Paspalum caespitosum*.
 437. *Aristida adscensionis*.
 438. *Eleusine indica*.
 439. *Paspalum vaginatum*.
 439½. *Sporobolus virginicus*.
 440. *Cenchrus carolinianus*.
 441. *Cenchrus echinatus*.
 442. *Dactyloctenium aegyptium*.
 443. *Cenchrus myosuroides*.
 444. *Pappophorum alopecuroideum*.
 445. *Sporobolus indicus*.
 446. *Chloris petraea*.
 447. *Chaetochloa setosa*.
 448. *Chaetochloa geniculata*.
 449. *Panicum maximum*.
 450. *Panicum barbinode*.
 451. *Eragrostis ciliaris*.

- 452. *Sporobolus argutus*.
- 453. *Sporobolus argutus*.
- 454. *Lasiacis divaricata*.
- 455. *Panicum utowanaeum*.
- 456. *Syntherisma digitata*.
- 457. *Panicum utowanaeum*.
- 1607. *Pappophorum alopecuroides*.

HIOHAM, BROTHER.

- 5. *Leptochloa scabra*.
- 111. *Paspalum glabrum*.
- 134. *Eriochloa subglabra*.
- 214. *Andropogon leucostachyus*.
- 312. *Stenotaphrum secundatum*.
- 315. *Panicum adpersum*.
- 316. *Panicum fasciculatum*.
- 319. *Anatherum zizanioides*.
- 320. *Paspalum plicatulum*.
- 324 (in part). *Echinochloa sabulicola*.
- 324 (in part.) *Hymenachne amplexicaulis*.
- 325. *Leptochloa scabra*.
- 327. *Eriochloa subglabra*.
- 347. *Paspalum notatum*.
- 355. *Eragrostis ciliaris*.
- 357. *Panicum fasciculatum*.
- 358. *Paspalum fimbriatum*.
- 360. *Panicum barbinode*.
- 361. *Eriochloa punctata*.
- 362. *Ichnanthus pallens*.
- 367. *Paspalum melanospermum*.
- 368. *Panicum laxum*.
- 369. *Isachne angustifolia*.
- 804. *Paspalum glabrum*.
- 807. *Paspalum notatum*.
- 816. *Andropogon glomeratus*.
- 818. *Eriochrysis cayennensis*.
- 837. *Bouteloua heterostega*.
- 2717. *Paspalum glabrum*.

HITCHCOCK, A. S.

- 115. *Panicum polycaulon*.
- 116. *Panicum chrysopsidifolium*.
- 117. *Panicum fusiforme*.
- 128. *Lasiacis sloanei*.
- 131. *Lasiacis grisebachii*.
- 140. *Panicum acuminatum*.
- 141. *Panicum utowanaeum*.
- 142. *Panicum geminatum*.
- 143. *Panicum geminatum*.

- 144. *Panicum distantiflorum*.
- 145. *Panicum reptans*.
- 146. *Panicum reptans*.
- 147. *Panicum adpersum*.
- 148. *Panicum adpersum*.
- 149. *Panicum bartowense*.
- 150. *Panicum dichotomiflorum*.
- 151. *Panicum dichotomiflorum*.
- 152. *Panicum elephantipes*.
- 153. *Panicum virgatum cubense*.
- 154. *Panicum tenerum*.
- 155. *Panicum stenodes*.
- 156. *Panicum maximum*.
- 157. *Panicum maximum*.
- 158. *Lasiacis divaricata*.
- 159. *Panicum adpersum*.
- 176. *Lasiacis rugelii*.
- 177. *Panicum laxum*.
- 178. *Panicum laxum*.
- 179. *Panicum exigulflorum*.
- 180. *Panicum millegrana*.
- 181. *Panicum parvifolium*.
- 231. *Aristida refracta*.
- 232. *Aristida gyrans*.
- 233. *Aristida gyrans*.
- 234. *Sporobolus berterianus*.
- 235. *Sporobolus argutus*.
- 236. *Sporobolus argutus*.
- 237. *Sporobolus cubensis*.
- 238. *Chloris petraea*.
- 239. *Chloris cruciata*.
- 240. *Chloris cruciata*.
- 241. *Chloris sagraeana*.
- 242. *Chloris sagraeana*.
- 243. *Chloris sagraeana*.
- 244. *Chloris ciliata*.
- 245. *Chloris ciliata*.
- 246. *Chloris paraguayensis*.
- 247. *Chloris paraguayensis*.
- 248. *Chloris paraguayensis*.
- 249. *Chloris virgata*.
- 250. *Leptochloa filiformis*.
- 251. *Leptochloa fascicularis*.
- 252. *Leptochloa virgata*.
- 253. *Leptochloa virgata*.
- 254. *Pappophorum alopecuroides*.
- 255. *Eragrostis amabilis*.
- 256. *Eragrostis ciliaris*.
- 257. *Eragrostis tephrosanthos*.
- 258. *Eragrostis tephrosanthos*.
- 259. *Eragrostis tephrosanthos*.
- 260. *Eragrostis elliottii*.
- 261. *Eragrostis cubensis*.

262. *Distichlis spicata*.
 452. *Bouteloua heterostega*.
 454. *Paspalum notatum*.
 455. *Paspalum minus*.
 456. *Paspalum plicatulum*.
 457. *Paspalum plicatulum*.
 458. *Paspalum poiiretii*.
 459. *Paspalum poiiretii*.
 461. *Paspalum poiiretii*.
 462. *Paspalum nanum*.
 463. *Paspalum lindenianum*.
 464. *Paspalum caespitosum*.
 465. *Paspalum caespitosum*.
 466. *Paspalum caespitosum*.
 467. *Paspalum caespitosum*.
 468. *Paspalum virgatum*.
 469. *Paspalum pulchellum*.
 470. *Paspalum simpsoni*.
 471. *Paspalum debile*.
 472. *Paspalum multicaule*.
 473. *Paspalum conjugatum*.
 474. *Paspalum conjugatum*.
 475. *Paspalum bakeri*.
 476. *Manisuris loricata*.
 477. *Paspalum secans*.
 478. *Paspalum secans*.
 479. *Andropogon malacostachyus*.
 480. *Andropogon bicornis*.
 481. *Andropogon nashianus*.
 482. *Leptocoryphium lanatum*.
 483. *Syntherisma leucocoma*.
 484. *Syntherisma leucocoma*.
 485. *Mesosetum loliiforme*.
 486. *Axonopus compressus*.
 487. *Hymenachne amplexicaulis*.
 488. *Oplismenus hirtellus*.
 489. *Oplismenus hirtellus*.
 490. *Echinochloa colonum*.
 491. *Chaetochloa verticillata*.
 492. *Cenchrus carolinianus*.
 493. *Cenchrus carolinianus*.
 494. *Homalocenchrus hexandrus*.
 495. *Reynaudia filiformis*.
 496. *Aristida scabra*.
 497. *Aristida scabra*.
 498. *Aristida curtifolia*.
 499. *Aristida refracta*.
 500. *Aristida curtifolia*.
 554. *Panicum leucothrix*.
 555. *Panicum albomarginatum*.
 560. *Panicum leucothrix*.
 9251. *Cenchrus echinatus*.
 9252. *Sporobolus indicus*.
 9253. *Leptochloa domingensis*.
 9254. *Chloris paraguayensis*.
 9255. *Valota insularis*.
 9256. *Panicum maximum*.
 9257. *Manisuris exaltata*.
 9258. *Lasiacis sorghoidea*.
 9259. *Panicum fasciculatum*.
 9260. *Paspalum conjugatum*.
 9261. *Axonopus compressus*.
 9262. *Chloris radiata*.
 9263. *Lithachne pauciflora*.
 9264. *Lasiacis divaricata*.
 9265. *Chaetochloa geniculata*.
 9266. *Eleusine indica*.
 9267. *Lasiacis sloanei*.
 9268. *Lasiacis divaricata*.
 9269. *Anthephora hermaphrodita*.
 9270. *Chaetochloa barbata*.
 9271. *Syntherisma digitata*.
 9272. *Syntherisma sanguinalis*.
 9273. *Dactyloctenium aegyptium*.
 9274. *Paspalum fimbriatum*.
 9276. *Chloris cruciata*.
 9277. *Chaetochloa barbata*.
 9278. *Panicum zizanioides*.
 9279. *Eragrostis pilosa*.
 9280. *Lasiacis sloanei*.
 9281. *Panicum trichoides*.
 9282. *Panicum adpersum*.
 9284. *Axonopus compressus*.
 9285. *Coix lachryma-jobi*.
 9286. *Sporobolus berterioanus*.
 9287. *Paspalum distichum*.
 9288. *Echinochloa colonum*.
 9289. *Eragrostis ciliaris*.
 9290. *Paspalum virgatum*.
 9290½. *Paspalum plicatulum*.
 9291. *Andropogon glomeratus*.
 9292. *Bambos vulgaris*.
 9293. *Arundo donax*.
 9294. *Paspalum lindenianum*.
 9295. *Paspalum simpsoni*.
 9297. *Chloris petraea*.
 9298. *Olyra latifolia*.
 9299. *Chaetochloa geniculata*.
 9300. *Cenchrus viridis*.
 9301. *Gynierium sagittatum*.
 9302. *Chloris polydactyla*.
 9303. *Leptochloa virgata*.
 9304. *Lasiacis divaricata*.
 9305. *Lasiacis sloanei*.
 9306. *Pharus glaber*.
 9307. *Homalocenchrus monandrus*.

9308. *Chaetochloa barbata*.
 9309. *Chloris ciliata*.
 9310. *Leptochloa filiformis*.
 9311. *Cenchrus echinatus*.
 9312. *Panicum fasciculatum*.
 9313. *Leptochloa virgata*.
 9314. *Cenchrus viridis*.
 9315. *Chaetochloa setosa*.
 9316. *Chaetochloa setosa*.
 9317. *Paspalum vaginatum*.
 9318. *Sporobolus argutus*.
 9319. *Paspalum plicatulum*.
 9320. *Chaetochloa palmifolia*.
 9321. *Panicum glutinosum*.
 9322. *Chloris polydactyla*.
 9323. *Panicum molle*.
 9324. *Heteropogon contortus*.
 9325. *Chaetochloa setosa*.
 9326. *Arundinella confinis*.
 9327. *Sporobolus indicus*.
 9328. *Syntherisma longiflora*.
 9329. *Syntherisma sanguinalis*.
 9330. *Paspalum plicatulum*.
 9331. *Pharus glaber*.
 9332. *Panicum trichoides*.
 9333. *Panicum laxum*.
 9334. *Paspalum paniculatum*.
 9335. *Lasiacis sorghoidea*.
 9336. *Andropogon bicornis*.
 9337. *Oplismenus setarius*.
 9338. *Andropogon virginicus*.
 9339. *Panicum barbinode*.
 9340. *Sporobolus purpurascens*.
 9341. *Andropogon brevifolius*.
 9342. *Andropogon gracilis*.
 9343. *Andropogon tener*.
 9344. *Sporobolus berterianus*.
 9345. *Andropogon saccharoides*.
 9346. *Sorghastrum parviflorum*.
 9347. *Paspalum virgatum*.
 9348. *Andropogon glomeratus*.
 9349. *Holcus halepensis*.
 9352. *Eragrostis pilosa*.
 9353. *Festuca bromoides*.
 9354. *Syntherisma longiflora*.
 9356. *Briza minor*.
 9357. *Poa annua*.
 9358. *Oplismenus setarius*.
 9359. *Paspalum paniculatum*.
 9360. *Senecio zeugites*.
 9361. *Andropogon virginicus*.
 9362. *Isachne rigens*.
 9363. *Lasiacis harrisii*.
 9364. *Sporobolus berterianus*.
 9365. *Chusquea abietifolia*.
 9368. *Agrostis alba*.
 9369. *Avena sativa*.
 9370. *Panicum glutinosum*.
 9371. *Poa compressa*.
 9374. *Phleum pratense*.
 9375. *Chusquea abietifolia*.
 9376. *Chloris cruciata*.
 9377. *Andropogon saccharoides*.
 9378. *Syntherisma sanguinalis*.
 9379. *Cenchrus echinatus*.
 9380. *Lasiacis sorghoidea*.
 9381. *Lasiacis sorghoidea*.
 9382. *Lasiacis sorghoidea*.
 9383. *Arundinella confinis*.
 9384. *Andropogon gracilis*.
 9385. *Andropogon virginicus*.
 9386. *Isachne arundinacea*.
 9388. *Oplismenus setarius*.
 9389. *Paspalum distichum*.
 9390. *Axonopus compressus*.
 9391. *Chaetochloa barbata*.
 9392. *Paspalum plicatulum*.
 9393. *Syntherisma sanguinalis*.
 9394. *Paspalum distichum*.
 9395. *Paspalum notatum*.
 9396. *Syntherisma longiflora*.
 9397. *Panicum laxum*.
 9398. *Panicum zizanioides*.
 9399. *Chaetochloa geniculata*.
 9400. *Paspalum virgatum*.
 9402. *Lithachne pauciflora*.
 9403. *Eragrostis pilosa*.
 9404. *Rytilix granularis*.
 9405. *Paspalum virgatum*.
 9406. *Andropogon glomeratus*.
 9407. *Panicum pilosum*.
 9408. *Chaetochloa scandens*.
 9409. *Lasiacis sorghoidea*.
 9410. *Olyra latifolia*.
 9411. *Panicum fasciculatum*.
 9412. *Chaetochloa barbata*.
 9413. *Lasiacis sloanei*.
 9414. *Leptochloa virgata*.
 9415. *Oplismenus setarius*.
 9416. *Paspalum paniculatum*.
 9417. *Paspalum simpsoni*.
 9418. *Eragrostis tephrosanthos*.
 9419. *Panicum zizanioides*.
 9419½. *Eragrostis ciliaris*.
 9420. *Lasiacis divaricata*.
 9421. *Syntherisma sanguinalis*.

9422. *Paspalum fimbriatum*.
 9423. *Panicum pilosum*.
 9424. *Lithachne pauciflora*.
 9425. *Sporobolus indicus*.
 9426. *Lasiacis divaricata*.
 9427. *Lasiacis divaricata*.
 9428. *Chloris cruciata*.
 9429. *Syntherisma sanguinalis*.
 9430. *Chloris ciliata*.
 9431. *Chaetochloa geniculata*.
 9432. *Eleusine indica*.
 9433. *Paspalum conjugatum*.
 9434. *Cenchrus echinatus*.
 9435. *Anatherum zizanioides*.
 9436. *Axonopus compressus*.
 9437. *Chloris radiata*.
 9438. *Paspalum lindenianum*.
 9438½. *Paspalum filiforme*.
 9439. *Paspalum fimbriatum*.
 9440. *Cenchrus viridis*.
 9441. *Valota insularis*.
 9442. *Paspalum poiretii*.
 9443. *Paspalum plicatulum*.
 9444. *Stenotaphrum secundatum*.
 9445. *Paspalum virgatum*.
 9446. *Andropogon glomeratus*.
 9447. *Chloris paraguayensis*.
 9448. *Andropogon bicornis*.
 9449. *Lasiacis divaricata*.
 9450. *Paspalum notatum*.
 9451. *Panicum glutinosum*.
 9452. *Sporobolus berterioanus*.
 9453. *Chloris petraea*.
 9454. *Paspalum distichum*.
 9455. *Leptochloa domingensis*.
 9456. *Paspalum virgatum*.
 9457. *Paspalum secans*.
 9458. *Chloris sagraeana*.
 9459. *Chloris polydactyla*.
 9460. *Andropogon virginicus*.
 9461. *Panicum laxum*.
 9462. *Manisuris exaltata*.
 9463. *Panicum diffusum*.
 9464. *Paspalum simpsoni*.
 9466. *Homalocenchrus monandrus*.
 9467. *Pharus glaber*.
 9468. *Oplismenus setarius*.
 9469. *Chloris cruciata*.
 9470. *Paspalum simpsoni*.
 9471. *Paspalum notatum*.
 9472. *Andropogon pertusus*.
 9473. *Chaetochloa barbata*.
 9475. *Panicum trichoides*.
 9476. *Paspalum simpsoni*.
 9477. *Chloris radiata*.
 9478. *Sporobolus indica*.
 9479. *Sporobolus berterioanus*.
 9480. *Paspalum simpsoni*.
 9481. *Andropogon virginicus*.
 9483. *Paspalum fimbriatum*.
 9484. *Stenotaphrum secundatum*.
 9485. *Chloris petraea*.
 9486. *Andropogon glomeratus*.
 9487. *Syntherisma sanguinalis*.
 9489. *Syntherisma digitata*.
 9490. *Chaetochloa geniculata*.
 9491. *Chaetochloa geniculata*.
 9492. *Andropogon bicornis*.
 9493. *Eragrostis ciliaris*.
 9494. *Paspalum paniculatum*.
 9495. *Paspalum notatum*.
 9513. *Panicum zizanioides*.
 9514. *Cenchrus echinatus*.
 9515. *Chaetochloa barbata*.
 9516. *Paspalum poiretii*.
 9517. *Panicum pilosum*.
 9518. *Paspalum filiforme*.
 9519. *Lasiacis divaricata*.
 9520. *Paspalum propinquum*.
 9521. *Oplismenus setarius*.
 9522. *Lithachne pauciflora*.
 9523. *Ichnanthus nemorosus*.
 9524. *Paspalum plicatulum*.
 9525. *Sporobolus purpurascens*.
 9526. *Chaetochloa geniculata*.
 9528. *Panicum rudgei*.
 9529. *Paspalum virgatum*.
 9530. *Panicum roanokense*.
 9531. *Ichnanthus pallens*.
 9532. *Panicum multirameum*.
 9533. *Paspalum poiretii*.
 9536. *Paspalum secans*.
 9537. *Capriola dactylon*.
 9538. *Panicum acuminatum*.
 9539. *Panicum laxum*.
 9540. *Paspalum notatum*.
 9540½. *Paspalum minus*.
 9541. *Eragrostis tephrosanthos*.
 9542. *Andropogon virginicus*.
 9543. *Andropogon brevifolius*.
 9544. *Paspalum filiforme*.
 9545. *Panicum laxum*.
 9546. *Andropogon leucostachyus*.
 9547. *Andropogon bicornis*.
 9548. *Panicum pilosum*.
 9549. *Paspalum plicatulum*.

9550. *Panicum polycaulon*.
 9551. *Panicum strigosum*.
 9552. *Panicum fusiforme*.
 9553. *Paspalum decumbens*.
 9554. *Syntherisma sanguinalis*.
 9555. *Paspalum virgatum*.
 9556. *Paspalum densum*.
 9557. *Paspalum millegrana*.
 9558. *Panicum fasciculatum*.
 9559. *Eragrostis pilosa*.
 9560. *Eragrostis amabilis*.
 9561. *Panicum polycaulon*.
 9562. *Paspalum decumbens*.
 9563. *Leptochloa domingensis*.
 9564. *Panicum acuminatum*.
 9565. *Andropogon piptatherus*.
 9566. *Cymbopogon nardus*.
 9567. *Manisuris exaltata*.
 9568. *Oplismenus setarius*.
 9569. *Lasiacis sorghoidea*.
 9570. *Lasiacis sorghoidea*.
 9571. *Lasiacis sorghoidea*.
 9572. *Andropogon fastigiatus*.
 9573. *Sporobolus purpurascens*.
 9574. *Syntherisma panicea*.
 9575. *Andropogon tener*.
 9576. *Andropogon gracilis*.
 9577. *Andropogon leucostachyus*.
 9579. *Panicum geminatum*.
 9580. *Panicum barbinode*.
 9581. *Stenotaphrum secundatum*.
 9582. *Paspalum repens*.
 9583. *Sporobolus berterianus*.
 9584. *Homalocenchrus hexandrus*.
 9585. *Hymenachne amplexicaulis*.
 9587. *Dactyloctenium aegyptium*.
 9588. *Cenchrus viridis*.
 9589. *Chloris paraguayensis*.
 9590. *Syntherisma digitata*.
 9591. *Chloris petraea*.
 9592. *Chloris ciliata*.
 9593. *Paspalum distichum*.
 9594. *Echinochloa colonum*.
 9595. *Eragrostis pilosa*.
 9595½. *Eragrostis tephrosanthos*.
 9597. *Chloris cruciata*.
 9598. *Paspalum propinquum*.
 9599½. *Paspalum simpsoni*.
 9600. *Chloris radiata*.
 9601. *Paspalum plicatulum*.
 9602. *Paspalum paniculatum*.
 9603. *Paspalum virgatum*.
 9604. *Chaetochloa barbata*.
 9605. *Manisuris exaltata*.
 9606. *Lasiacis sloanei*.
 9607. *Gynerium sagittatum*.
 9608. *Lasiacis oaxacensis*.
 9609. *Panicum zizanioides*.
 9610. *Syntherisma sanguinalis*.
 9611. *Cenchrus echinatus*.
 9612. *Chaetochloa geniculata*.
 9613. *Lithachne pauciflora*.
 9614. *Eragrostis ciliaris*.
 9615. *Andropogon brevifolius*.
 9616. *Andropogon gracilis*.
 9617. *Leptochloa virgata*.
 9618. *Sporobolus indicus*.
 9619. *Ichnanthus pallens*.
 9620. *Andropogon glomeratus*.
 9621. *Oplismenus setarius*.
 9622. *Chloris polydactyla*.
 9623. *Olyra latifolia*.
 9624. *Paspalum simpsoni*.
 9625. *Paspalum fimbriatum*.
 9626. *Panicum pilosum*.
 9627. *Panicum glutinosum*.
 9628. *Lasiacis divaricata*.
 9629. *Paspalum conjugatum*.
 9630. *Panicum adpersum*.
 9631. *Panicum reptans*.
 9632. *Leptochloa virgata*.
 9634. *Eragrostis tephrosanthos*.
 9635. *Eragrostis pilosa*.
 9636. *Syntherisma sanguinalis*.
 9637. *Cenchrus carolinianus*.
 9638. *Spartina patens juncea*.
 9639. *Sporobolus virginicus*.
 9640. *Sporobolus argutus*.
 9641. *Paspalum vaginatum*.
 9642. *Paspalum distachyon*.
 9643. *Leptochloa fascicularis*.
 9644. *Paspalum secans*.
 9646. *Chaetochloa magna*.
 9647. *Andropogon glomeratus*.
 9648. *Phragmites phragmites*.
 9649. *Paspalum secans*.
 9650. *Echinochloa sabulicola*.
 9653. *Panicum geminatum*.
 9654. *Paspalum propinquum*.
 9655. *Paspalum virgatum*.
 9656. *Eragrostis tephrosanthos*.
 9656½. *Andropogon virginicus*.
 9657. *Paspalum densum*.
 9658. *Panicum laxum*.
 9659. *Hymenachne amplexicaulis*.
 9660. *Oplismenus hirtellus*.

9662. *Bouteloua americana*.
 9663. *Paspalum lindenianum*.
 9664. *Chloris paraguayensis*.
 9665. *Eragrostis pilosa*.
 9666. *Chloris radiata*.
 9667. *Paspalum vaginatum*.
 9668. *Paspalum simpsoni*.
 9669. *Syntherisma sanguinalis*.
 9670. *Paspalum secans*.
 9671. *Chloris ciliata*.
 9672. *Chloris petraea*.
 9673. *Stenotaphrum secundatum*.
 9674. *Paspalum glabrum*.
 9675. *Valota insularis*.
 9676. *Chloris polydactyla*.
 9677. *Andropogon glomeratus*.
 9678. *Paspalum distachyon*.
 9679. *Eriochloa punctata*.
 9680. *Andropogon virginicus*.
 9681. *Oplismenus setarius*.
 9682. *Panicum fasciculatum*.
 9683. *Axonopus compressus*.
 9684. *Panicum zizanioides*.
 9685. *Sporobolus indicus*.
 9686. *Dactyloctenium aegyptium*.
 9687. *Lasiacis divaricata*.
 9688. *Paspalum conjugatum*.
 9689. *Panicum reptans*.
 9690. *Capriola dactylon*.
 9691. *Paspalum fimbriatum*.
 9692. *Antheophora hermaphrodita*.
 9693. *Panicum barbinode*.
 9694. *Chaetochloa barbata*.
 9695. *Chloris sagraeana*.
 9696. *Paspalum notatum*.
 9697. *Panicum acuminatum*.
 9698. *Anthoxanthum odoratum*.
 9699. *Bromus unioloides*.
 9700. *Pennisetum orientale triflorum*.
 9701. *Festuca bromoides*.
 9702. *Chaetochloa lutescens*.
 9703. *Syntherisma longiflora*.
 9704. *Andropogon virginicus*.
 9705. *Syntherisma argyrostachya*.
 9706. *Isachne rigens*.
 9707. *Andropogon gracilis*.
 9708. *Panicum glutinosum*.
 9709. *Senlites zeugites*.
 9710. *Briza minor*.
 9711. *Paspalum notatum*.
 9712. *Poa annua*.
 9713. *Briza maxima*.
 9714. *Bromus sterilis*.
 9715. *Chusquea abietifolia*.
 9716. *Sporobolus purpurascens*.
 9717. *Bambos nana*.
 9718. *Chaetochloa scandens*.
 9719. *Chaetochloa palmifolia*.
 9720. *Danthonia shrevei*.
 9721. *Sporobolus berterioanus*.
 9722. *Panicum acuminatum*.
 9723. *Chaetochloa scandens*.
 9724. *Syntherisma sanguinalis*.
 9725. *Pennisetum orientale triflorum*.
 9726. *Lasiacis harrisii*.
 9727. *Chaetochloa palmifolia*.
 9728. *Isachne arundinacea*.
 9729. *Lasiacis sorghoidea*.
 9730. *Lasiacis harrisii*.
 9731. *Oplismenus setarius*.
 9732. *Isachne rigens*.
 9733. *Senlites zeugites*.
 9734. *Chusquea abietifolia*.
 9736. *Sporobolus purpurascens*.
 9737. *Oplismenus setarius*.
 9738. *Panicum acuminatum*.
 9739. *Briza minor*.
 9740. *Poa annua*.
 9741. *Ichnanthus nemorosus*.
 9742. *Isachne pygmaea*.
 9743. *Bouteloua americana*.
 9744. *Bouteloua americana*.
 9745. *Chaetochloa setosa*.
 9746. *Sporobolus virginicus*.
 9747. *Panicum fasciculatum*.
 9748. *Oplismenus hirtellus*.
 9749. *Homalocenchrus monandrus*.
 9750. *Panicum adspersum*.
 9751. *Pharus glaber*.
 9752. *Panicum geminatum*.
 9752½. *Sporobolus virginicus*.
 9755. *Nazia allena*.
 9756. *Heteropogon contortus*.
 9757. *Chloris ciliata*.
 9758. *Panicum molle*.
 9759. *Sporobolus virginicus*.
 9760. *Sporobolus argutus*.
 9761. *Uniola virgata*.
 9762. *Chaetochloa palmifolia*.
 9763. *Andropogon glomeratus*.
 9764. *Chloris paraguayensis*.
 9765. *Paspalum poiretii*.
 9766. *Paspalum simpsoni*.
 9767. *Chloris petraea*.
 9768. *Chaetochloa barbata*.
 9769. *Eragrostis pilosa*.

9770. *Lithachne pauciflora*.
9771. *Chloris radiata*.
9772. *Sporobolus indicus*.
9773. *Paspalum fimbriatum*.
9774. *Syntherisma sanguinalis*.
9775. *Paspalum vaginatum*.
9776. *Paspalum millegrana*.
9777. *Stenotaphrum secundatum*.
9778. *Leptochloa virgata*.
9779. *Panicum zizanioides*.
9780. *Gynerium sagittatum*.
9781. *Panicum zizanioides*.
9782. *Panicum pilosum*.
9783. *Oplismenus setarius*.
9784. *Paspalum notatum*.
9785. *Panicum glutinosum*.
9786. *Panicum laxum*.
9787. *Chloris radiata*.
9788. *Paspalum plicatulum*.
9789. *Paspalum filiforme*.
9790. *Paspalum paniculatum*.
9791. *Paspalum virgatum*.
9792. *Paspalum fimbriatum*.
9793. *Chaetochloa barbata*.
9794. *Oryza sativa*.
9795. *Paspalum serratum*.
9796. *Lasiacis sorghoidea*.
9797. *Paspalum conjugatum*.
9798. *Ichnanthus nemorosus*.
9799. *Ichnanthus pallens*.
9800. *Lasiacis oaxacensis*.
9801. *Lasiacis sloanei*.
9802. *Lasiacis divaricata*.
9803. *Andropogon bicornis*.
9804. *Imperata contracta*.
9805. *Themeda arguens*.
9806. *Andropogon glomeratus*.
9807. *Stenotaphrum secundatum*.
9808. *Lasiacis sorghoidea*.
9809. *Paspalum leptocaulon*.
9810. *Chloris sagraeana*.
9811. *Leptochloa virgata*.
9812. *Chaetochloa scandens*.
9813. *Lasiacis sorghoidea*.
9814. *Arundinella confinis*.
9815. *Lithachne pauciflora*.
9816. *Paspalum simpsoni*.
9817. *Lasiacis sorghoidea*.
9818. *Sporobolus indicus*.
9819. *Eragrostis tephrosanthos*.
9820. *Chloris cruciata*.
9821. *Paspalum notatum*.
9822. *Homalocenchrus monandrus*.
9823. *Chloris sagraeana*.
9824. *Bouteloua americana*.
9825. *Sporobolus indicus*.
9826. *Chloris paraguayensis*.
9827. *Syntherisma digitata*.
9828. *Cenchrus echinatus*.
9829. *Chloris ciliata*.
9830. *Panicum adpersum*.
9831. *Nazia aliena*.
9833. *Paspalum simpsoni*.
9834. *Chaetochloa barbata*.
9835. *Syntherisma sanguinalis*.
9836. *Leptochloa domingensis*.
9837. *Lasiacis sorghoidea*.
9838. *Lasiacis divaricata*.
9839. *Heteropogon contortus*.
9840. *Paspalum fimbriatum*.
9841. *Cenchrus viridis*.
9842. *Chloris polydactyla*.
9843. *Paspalum plicatulum*.
9844. *Andropogon gracilis*.
9845. *Aristida cognata*.
9846. *Chaetochloa setosa*.
9847. *Chloris sagraeana*.
9848. *Andropogon saccharoides*.
9849. *Chaetochloa geniculata*.
9851. *Cenchrus gracillimus*.
9852. *Eragrostis cubensis*.
9853. *Aristida refracta*.
9854. *Eragrostis elliotii*.
9856. *Chloris ciliata*.
9857. *Sporobolus argutus*.
9858. *Ischaemum rugosum*.
9859. *Eriochloa subglabra*.
9860. *Bouteloua americana*.
9861. *Hymenachne amplexicaulis*.
9862. *Echinochloa sabulicola*.
9863. *Leptochloa fascicularis*.
9864. *Paspalum distachyon*.
9865. *Chloris polydactyla*.
9866. *Paspalum vaginatum*.
9867. *Echinochloa colonum*.
9868. *Echinochloa spectabilis*.
9869. *Paspalum millegrana*.
9870. *Panicum fasciculatum*.
9871. *Oplismenus setarius*.
9872. *Lithachne pauciflora*.
9873. *Paspalum lindenianum*.
9874. *Paspalum simpsoni*.
9875. *Eleusine indica*.
9876. *Stenotaphrum secundatum*.
9877. *Panicum geminatum*.
9878. *Panicum elephantipes*.

9879. *Leptochloa virgata*.
 9880. *Eragrostis pilosa*.
 9881. *Lasiacis divaricata*.
 9882. *Syntherisma digitata*.
 9883. *Chloris petraea*.
 9884. *Panicum condensum*.
 9885. *Paspalum leptocaulon*.
 9886. *Eragrostis pilosa*.
 9887. *Eragrostis pilosa*.
 9888. *Eragrostis pilosa*.
 9889. *Eragrostis tephrosanthos*.
 9890. *Chloris sagraeana*.
 9891. *Chaetochloa onurus*.
 9892. *Lasiacis sorghoidea*.
 9893. *Lasiacis sorghoidea*.
 9941. *Panicum barbinode*.
 9942. *Eragrostis ciliaris*.
 9943. *Panicum trichanthum*.
 9944. *Manisuris exaltata*.
 9945. *Leptochloa virgata*.
 9946. *Panicum trichoides*.
 9947. *Syntherisma digitata*.
 9948. *Syntherisma digitata*.
 9949. *Chloris radiata*.
 9950. *Axonopus compressus*.
 9950½. *Lasiacis sorghoidea*.
 9951. *Eriochloa subglabra*.
 9952. *Paspalum conjugatum*.
 9953. *Panicum polygonatum*.
 9954. *Valota laxa*.
 9955. *Ichnanthus pallens*.
 9956. *Eleusine indica*.
 9957. *Paspalum nutans*.
 9957½. *Paspalum decumbens*.
 9958. *Panicum zizanioides*.
 9959. *Andropogon bicornis*.
 9960. *Paspalum paniculatum*.
 9961. *Panicum pilosum*.
 9962. *Lasiacis ligulata*.
 9963. *Lasiacis sorghoidea*.
 9964. *Oplismenus hirtellus*.
 9965. *Chaetochloa barbata*.
 9966. *Ichnanthus pallens*.
 9967. *Ichnanthus pallens*.
 9968. *Olyra latifolia*.
 9969. *Orthoclada laxa*.
 9970. *Eriochloa subglabra*.
 9971. *Eragrostis amabilis*.
 9972. *Eragrostis amabilis*.
 9973. *Sporobolus berterioanus*.
 9974. *Eragrostis tephrosanthos*.
 9975. *Dactyloctenium aegyptium*.
 9976. *Panicum fasciculatum*.
 9977. *Lasiacis ruscifolia*.
 9978. *Chaetochloa sulcata*.
 9978½. *Syntherisma digitata*.
 9979. *Panicum millegrana*.
 9980. *Lasiacis sorghoidea*.
 9981. *Olyra latifolia*.
 9982. *Paspalum nutans*.
 9983. *Paspalum pilcatulum*.
 9984. *Panicum laxum*.
 9985. *Anatherum zizanioides*.
 9986. *Bambos vulgaris*.
 9987. *Paspalum pilosum*.
 9988. *Axonopus equitans*.
 9989. *Oplismenus hirtellus*.
 9990. *Lasiacis patentiflora*.
 9991. *Chaetochloa impressa*.
 9992. *Valota insularis*.
 9993. *Paspalum paniculatum*.
 9994. *Leptochloa domingensis*.
 9995. *Cenchrus viridis*.
 9996. *Cenchrus echinatus*.
 9997. *Paspalum virgatum*.
 9998. *Andropogon condensatus*.
 9999. *Ichnanthus ichnodes*.
 10000. *Chaetochloa impressa*.
 10001. *Lasiacis ruscifolia*.
 10002. *Chaetochloa tenacissima*.
 10003. *Ichnanthus ichnodes*.
 10004. *Ichnanthus pallens*.
 10005. *Oplismenus hirtellus*.
 10006. *Lasiacis sorghoidea*.
 10007. *Lasiacis ligulata*.
 10008. *Syntherisma longiflora*.
 10009. *Syntherisma sanguinalis*.
 10010. *Oplismenus hirtellus*.
 10011. *Paspalum fimbriatum*.
 10012. *Leptochloa scabra*.
 10013. *Ichnanthus pallens*.
 10014. *Panicum fasciculatum*.
 10015. *Paspalum nutans*.
 10016. *Paspalum orbiculatum*.
 10017. *Tripsacum dactyloides*.
 10018. *Chaetochloa geniculata*.
 10019. *Eragrostis tephrosanthos*.
 10020. *Lasiacis ligulata*.
 10021. *Lasiacis ruscifolia*.
 10022. *Panicum grande*.
 10023. *Oryza latifolia*.
 10024. *Eragrostis glomerata*.
 10025. *Paspalum densum*.
 10026. *Echinochloa colonum*.
 10027. *Imperata contracta*.
 10028. *Leptochloa virgata*.

10029. *Paspalum fasciculatum*.
 10030. *Paspalum virgatum*.
 10031. *Homalocenchrus hexandrus*.
 10031½. *Eriochloa punctata*.
 10032. *Hymenachne amplexicaulis*.
 10033. *Ichnanthus axillaris*.
 10034. *Lasiacis patentiflora*.
 10035. *Lasiacis sorghoidea*.
 10036. *Paspalum paniculatum*.
 10037. *Lasiacis patentiflora*.
 10038. *Andropogon condensatus*.
 10039. *Andropogon bicornis*.
 10040. *Paspalum decumbens*.
 10041. *Ichnanthus nemorosus*.
 10042. *Pharus latifolius*.
 10043. *Chaetochloa sulcata*.
 10044. *Panicum barbinode*.
 10045. *Panicum pilosum*.
 10046. *Pharus latifolius*.
 10047. *Coix lachryma-jobi*.
 10048. *Leptochloa virgata*.
 10049. *Panicum maximum*.
 10050. *Paspalum vaginatum*.
 10051. *Sporobolus littoralis*.
 10052. *Ichnanthus tenuis*.
 10053. *Panicum altum*.
 10054. *Gynerium sagittatum*.
 10055. *Leptochloa domingensis*.
 10056. *Cenchrus insularis*.
 10057. *Cenchrus echinatus*.
 10058. *Sporobolus indicus*.
 10059. *Chaetochloa setosa*.
 10060. *Leptochloa filiformis*.
 10061. *Lasiacis sorghoidea*.
 10062. *Lasiacis divaricata*.
 10063. *Lasiacis ruscifolia*.
 10064. *Lasiacis sorghoidea*.
 10065. *Panicum parvifolium*.
 10066. *Paspalum pulchellum*.
 10067. *Panicum cyanescens*.
 10068. *Panicum laxum*.
 10069. *Panicum caricoides*.
 10069½. *Panicum stenodes*.
 10070. *Andropogon virgatus*.
 10071. *Eriochloa subglabra*.
 10072. *Andropogon leucostachyus*.
 10073. *Paspalum virgatum*.
 10074. *Axonopus compressus*.
 10075. *Paspalum pilosum*.
 10076. *Andropogon brevifolius*.
 10077. *Panicum polygonatum*.
 10078. *Axonopus compressus*.
 10079. *Raddia nana*.
 10081. *Thrasya paspaloides*.
 10082. *Leptochloa longa*.
 10084. *Valota laxa*.
 10086. *Paspalum distichum*.
 10087. *Panicum millegrana*.
 10088. *Paspalum pilosum*.
 10089. *Gynerium sagittatum*.
 10090. *Paspalum plicatulum*.
 10091. *Panicum laxum*.
 10092. *Paspalum coryphaeum*.
 10093. *Axonopus macrostachyus*.
 10094. *Axonopus pellitus*.
 10095. *Imperata brasiliensis*.
 10096. *Antheophora hermaphrodita*.
 10097. *Andropogon leucostachyus*.
 10098. *Panicum laxum*.
 10099. *Panicum aquaticum*.
 10101. *Axonopus capillaris*.
 10102. *Paspalum multicaule*.
 10103. *Pharus latifolius*.
 10104. *Ichnanthus pallens*.
 10105. *Olyra latifolia*.
 10106. *Leptochloa scabra*.
 10107. *Paspalum coryphaeum*.
 10108. *Paspalum vaginatum*.
 10109. *Arundinella confinis*.
 10110. *Eragrostis glomerata*.
 10111. *Valota insularis*.
 10112. *Paspalum plicatulum*.
 10113. *Sporobolus littoralis*.
 10114. *Capriola dactylon*.
 10115. *Paspalum densum*.
 10116. *Syntherisma digitata*.
 10117. *Lasiacis ruscifolia*.
 10118. *Paspalum virgatum*.
 10119. *Imperata contracta*.
 10120. *Lasiacis ligulata*.
 10121. *Panicum pilosum*.
 10122. *Streptogyne crinita*.
 10123. *Oplismenus hirtellus*.
 10124. *Pharus parvifolius*.
 10125. *Ichnanthus axillaris*.
 10126. *Oplismenus setarius*.
 10127. *Raddia biformis*.
 10128. *Orthoclada laxa*.
 10129. *Ichnanthus axillaris*.
 10130. *Ichnanthus pallens*.
 10131. *Lasiacis sorghoidea*.
 10133. *Olyra ciliatifolia*.
 10134. *Paspalum saccharoides*.
 10135. *Paspalum decumbens*.
 10136. *Lasiacis ruscifolia*.
 10137. *Leptochloa scabra*.

10138. *Valota insularis*.
 10139. *Paspalum vaginatum*.
 10140. *Ichnanthus pallens*.
 10142. *Imperata contracta*.
 10143. *Valota laxa*.
 10144. *Oryza latifolia*.
 10145. *Paspalum millegrana*.
 10146. *Panicum trichanthum*.
 10148. *Panicum grande*.
 10149. *Panicum laxum*.
 10150. *Chaetochloa sulcata*.
 10151. *Lasiacis ligulata*.
 10152. *Eragrostis tephrosanthos*.
 10153. *Pennisetum setosum*.
 10154. *Panicum altum*.
 10155. *Cenchrus echinatus*.
 10156. *Paspalum millegrana*.
 10157. *Antheophora hermaphrodita*.
 10158. *Panicum geminatum*.
 10159. *Panicum altum*.
 10160. *Andropogon bicornis*.
 10161. *Sporobolus littoralis*.
 10162. *Stenotaphrum secundatum*.
 10163. *Sporobolus argutus*.
 10164. *Sporobolus littoralis*.
 10165. *Syntherisma sanguinalis*.
 10166. *Paspalum orbiculatum*.
 10167. *Eriochloa punctata*.
 10168. *Holcus halepensis*.
 10169. *Pennisetum orientale triflorum*.
 10170. *Lasiacis sorghoidea*.
 10171. *Chaetochloa sulcata*.
 10172. *Cymbopogon nardus*.
 10173. *Axonopus appendiculatus*.
 10174. *Ichnanthus tenuis*.
 10175. *Paspalum decumbens*.
 10176. *Pennisetum setosum*.
 10177. *Panicum hirtum*.
 10178. *Ichnanthus ichnodes*.
 10179. *Ichnanthus ichnodes*.
 10180. *Chaetochloa impressa*.
 10181. *Panicum rudgei*.
 10182. *Arundinella confinis*.
 10184. *Paspalum coryphaeum*.
 10185. *Trachypogon plumosus*.
 10186. *Paspalum coryphaeum*.
 10187. *Thrasya robusta*.
 10188. *Andropogon selloanus*.
 10189. *Paspalum pilosum*.
 10190. *Paspalum plicatulum*.
 10191. *Ichnanthus ichnodes*.
 10192. *Paspalum coryphaeum*.
 10194. *Andropogon semiberbis*.
 10195. *Olyra latifolia*.
 10196. *Leptochloa domingensis*.
 10197. *Oplismenus hirtellus*.
 10198. *Oplismenus hirtellus*.
 10199. *Ichnanthus tenuis*.
 10200. *Paspalum nutans*.
 10201. *Paspalum virgatum*.
 10202. *Eragrostis ciliaris*.
 10203. *Eragrostis pilosa*.
 10204. *Panicum barbinode*.
 10205. *Syntherisma sanguinalis*.
 10206. *Andropogon condensatus*.
 10207. *Andropogon bicornis*.
 10208. *Panicum pilosum*.
 10209. *Cenchrus echinatus*.
 10210. *Syntherisma digitata*.
 10211. *Echinochloa colonum*.
 10212. *Panicum reptans*.
 10213. *Paspalum plicatulum*.
 10214. *Coix lachryma-jobi*.
 10215. *Bouteloua americana*.
 10216. *Panicum fasciculatum*.
 10217. *Sporobolus littoralis*.
 10218. *Stenotaphrum secundatum*.
 10219. *Sporobolus berteroi*.
 10220. *Andropogon pertusus panormitanus*.
 10221. *Olyra latifolia*.
 10222. *Oplismenus hirtellus*.
 10223. *Leptochloa virgata*.
 10224. *Gynerium sagittatum*.
 10225. *Chaetochloa barbata*.
 10226. *Capriola dactylon*.
 10227. *Axonopus compressus*.
 10228. *Paspalum conjugatum*.
 10229. *Sporobolus indicus*.
 10230. *Dactyloctenium aegyptium*.
 10231. *Phragmites phragmites*.
 10232. *Sporobolus littoralis*.
 10233. *Panicum altum*.
 10234. *Andropogon pertusus*.
 10235. *Pennisetum setosum*.
 10236. *Leptochloa virgata*.
 10237. *Eleusine indica*.
 10238. *Chloris radiata*.
 10239. *Panicum maximum*.
 10240. *Ichnanthus pallens*.
 10241. *Oplismenus hirtellus*.
 10242. *Panicum pilosum*.
 10243. *Leptochloa filiformis*.
 10244. *Syntherisma digitata*.
 10245. *Panicum laxum*.
 10246. *Valota laxa*.

10247. *Lasiacis sorghoidea*.
 10248. *Ichnanthus pallens*.
 10249. *Paspalum paniculatum*.
 10250. *Eriochloa punctata*.
 10251. *Chaetochloa barbata*.
 10252. *Oplismenus hirtellus*.
 10253. *Valota insularis*.
 10254. *Lasiacis divaricata*.
 10255. *Lasiacis patentiflora*.
 10256. *Lasiacis divaricata*.
 10257. *Lasiacis patentiflora*.
 10258. *Panicum zizanioides*.
 10259. *Leptochloa scabra*.
 10260. *Chaetochloa geniculata*.
 10261. *Lasiacis ligulata*.
 10262. *Lasiacis ligulata*.
 10263. *Ichnanthus axillaris*.
 10264. *Olyra latifolia*.
 10265. *Panicum pilosum*.
 10266. *Oplismenus hirtellus*.
 10267. *Raddia urbaniana*.
 10268. *Lasiacis patentiflora*.
 10269. *Lasiacis ligulata*.
 10270. *Lasiacis patentiflora*.
 10271. *Oplismenus hirtellus*.
 10272. *Panicum laxum*.
 10273. *Imperata contracta*.
 10274. *Andropogon bicornis*.
 10275. *Lasiacis ligulata*.
 10276. *Chaetochloa palmifolia*.
 10277. *Arundinella confinis*.
 10278. *Paspalum saccharoides*.
 10279. *Isachne disperma*.
 10281. *Paspalum fasciculatum*.
 10282. *Chaetochloa sulcata*.
 10283. *Paspalum distichum*.
 10284. *Echinochloa spectabilis*.
 10285. *Paspalum millegrana*.
 10286. *Sporobolus berterianus*.
 10287. *Paspalum vaginatum*.
 10288. *Leptochloa filiformis*.
 10289. *Eragrostis amabilis*.
 10291. *Hymenachne amplexicaulis*.
 10293. *Leptochloa scabra*.
 10297. *Panicum polygonatum*.
 10299. *Paspalum nutans*.
 10301. *Paspalum nutans*.
 10306. *Panicum polygonatum*.
 10308. *Paspalum decumbens*.
 10309. *Panicum pilosum*.
 10310. *Panicum hirtum*.
 10313. *Ichnanthus tenuis*.
 10315. *Homalocenchrus hexandrus*.

10317. *Lasiacis sorghoidea*.
 10319. *Eragrostis glomerata*.
 10320. *Panicum hirtum*.
 10323. *Lasiacis patentiflora*.
 10324. *Lasiacis patentiflora*.
 10326. *Olyra latifolia*.
 10327. *Olyra latifolia*.
 10328. *Syntherisma longiflora*.
 10329. *Eragrostis tephrosanthos*.
 10332. *Eriochloa subglabra*.
 10335. *Thrasya paspaloides*.
 10337. *Paspalum serpentinum*.
 10338. *Paspalum pulchellum*.
 10339. *Axonopus aureus*.
 10340. *Paspalum multicaule*.
 10342. *Trachypogon plumosus*.
 10343. *Panicum laxum*.
 10344. *Eragrostis acutiflora*.
 10345. *Andropogon leucostachyus*.
 10346. *Panicum stenodoides*.
 10347. *Panicum stenodes*.
 10348. *Andropogon virgatus*.
 10349. *Panicum cyanescens*.
 10350. *Paspalum pumilum*.
 10351. *Panicum laxum*.
 10352. *Thrasya robusta*.
 10353. *Paspalum decumbens*.
 10354. *Panicum cyanescens*.
 10356. *Sacciolepis myuros*.
 10357. *Ichnanthus ichnodes*.
 10358. *Panicum pilosum*.
 10361. *Panicum laxum*.
 10362. *Isachne polygonoides*.
 10363. *Panicum hirtum*.
 10364. *Panicum cyanescens*.
 10366. *Paspalum millegrana*.
 10367. *Homalocenchrus hexandrus*.
 10368. *Oplismenus hirtellus*.
 10374. *Lasiacis sloanei*.
 10375. *Antheophora hermaphrodita*.
 10376. *Panicum grande*.
 10377. *Leptochloa longa*.

HOLM, T.

3. *Ichnanthus pallens*.
 26. *Lasiacis divaricata*.
 34. *Panicum laxum*.
 40. *Aristida portoricensis*.
 47. *Panicum aciculare*.
 56. *Eriochloa subglabra*.
 59. *Panicum polycaulon*.
 59b. *Panicum acuminatum*.

- 74. *Lasiacis sorghoidea*.
- 75. *Arundinella confinis*.
- 76. *Andropogon leucostachyus*.
- 82. *Andropogon fastigiatus*.
- 84. *Paspalum secans*.
- 85. *Rytidix granularis*.
- 87. *Andropogon brevifolius*.
- 88. *Paspalum decumbens*.
- 91. *Paspalum fimbriatum*.
- 116. *Lasiacis sorghoidea*.
- 124. *Oplismenus setarius*.
- 129. *Panicum trichoides*.
- 130. *Panicum fasciculatum*.
- 163. *Sporobolus berterianus*.
- 165. *Ichnanthus pallens*.
- 171. *Axonopus compressus*.
- 173. *Paspalum notatum*.
- 174. *Panicum laxum*.
- 178. *Andropogon semiberbis*.
- 192. *Leptocoryphium lanatum*.
- 193. *Leptocoryphium lanatum*.
- 199. *Paspalum paniculatum*.

IMRAY, J.

- 161. *Syntherisma digitata*.
- 311. *Paspalum saccharoides*.

JOHNSTON, J. R.

- 10. *Eriochloa subglabra*.
- 126. *Sporobolus indicus*.
- 127. *Syntherisma digitata*.
- 143. *Panicum trichanthum*.
- 372. *Capriola dactylon*.
- 375. *Paspalum paniculatum*.
- 381. *Paspalum conjugatum*.
- 538. *Paspalum plicatulum*.
- 893. *Chaetochloa geniculata*.
- 972. *Valota insularis*.
- 1011. *Paspalum plicatulum*.
- 1027. *Chaetochloa setosa*.

JONES, J.

- 1. *Melinis minutiflora*.
- 2. *Arundinella confinis*.
- 3. *Chaetochloa palmifolia*.
- 4. *Capriola dactylon*.
- 5. *Pennisetum setosum*.
- 6. *Chaetochloa geniculata*.

- 7. *Syntherisma digitata*.
- 8. *Andropogon condensatus*.
- 9. *Sporobolus indicus*.
- 10. *Panicum maximum*.
- 11. *Eleusine indica*.
- 12. *Syntherisma digitata*.
- 13. *Cenchrus echinatus*.
- 14. *Eleusine indica*.
- 15. *Chloris paraguayensis*.
- 16. *Paspalum conjugatum*.
- 17. *Ischaemum latifolium*.
- 18. *Eragrostis ciliaris*.
- 19. *Paspalum virgatum*.
- 20. *Panicum pilosum*.
- 21. *Panicum laxum*.
- 22. *Eleusine indica*.
- 23. *Eleusine indica*.
- 24. *Paspalum conjugatum*.
- 25. *Panicum laxum*.
- 26. *Chloris radiata*.
- 27. *Eleusine indica*.
- 31. *Panicum trichoides*.
- 32. *Echinochloa colonum*.
- 33. *Chloris paraguayensis*.
- 35. *Paspalum paniculatum*.
- 36. *Eriochloa punctata*.
- 37. *Oplismenus hirtellus*.
- 38. *Isachne disperma*.
- 39. *Paspalum pumilum*.
- 40. *Dactyloctenium aegyptium*.
- 41. *Ischaemum latifolium*.
- 42. *Panicum barbinode*.
- 43. *Chaetochloa barbata*.
- 44. *Eragrostis pilosa*.
- 45. *Axonopus compressus*.
- 46. *Bouteloua americana*.
- 47. *Paspalum glabrum*.
- 48. *Stenotaphrum secundatum*.
- 49. *Lasiacis sloanei*.
- 50. *Oplismenus hirtellus*.
- 51. *Andropogon brevifolius*.
- 61. *Leptochloa virgata*.
- 62. *Valota insularis*.
- 63. *Sporobolus indicus*.

LEÓN, BROTHER.¹

- 117. *Paspalum notatum*.
- 188. *Cenchrus echinatus*.

¹ On some of Brother León's collections a second name is associated with his, that of Brother Charles, Brother Clément, Brother Hioram, or Brother Sergius, Father Roca, F. R. Cazañas, or Señor Boillot. Brother León has explained in a letter that these collections form a single series with his individual numbers; hence they are here listed under his name.

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| <p>1881. <i>Cenchrus carolinianus</i>.
 190. <i>Panicum diffusum</i>.
 193. <i>Andropogon virginicus</i>.
 209. <i>Trachypogon gouini</i>.
 268. <i>Paspalum caespitosum</i>.
 269. <i>Chaetochloa geniculata</i>.
 271. <i>Holcus halepensis</i>.
 272. <i>Paspalum denticulatum</i>.
 273. <i>Dactyloctenium aegyptium</i>.
 274. <i>Opizia stolonifera</i>.
 275. <i>Sporobolus indicus</i>.
 276 (in part). <i>Panicum reptans</i>.
 276 (in part). <i>Eragrostis tephrosanthos</i>.
 277. <i>Eragrostis amabilis</i>.
 278. <i>Eleusine indica</i>.
 279. <i>Syntherisma sanguinalis</i>.
 280. <i>Aristida scabra</i>.
 281. <i>Eragrostis ciliaris</i>.
 282. <i>Sporobolus indicus</i>.
 283. <i>Panicum barbinode</i>.
 284. <i>Sporobolus virginicus</i>.
 285. <i>Sporobolus argutus</i>.
 286. <i>Paspalum poiretii</i>.
 287. <i>Chloris sagraeana</i>.
 288. <i>Opizia stolonifera</i>.
 289. <i>Dactyloctenium aegyptium</i>.
 290. <i>Capriola dactylon</i>.
 291. <i>Panicum adpersum</i>.
 292. <i>Panicum reptans</i>.
 293. <i>Bouteloua heterostega</i>.
 294. <i>Eleusine indica</i>.
 295. <i>Eragrostis tephrosanthos</i>.
 296. <i>Panicum repens</i>.
 297. <i>Panicum reptans</i>.
 298. <i>Axonopus compressus</i>.
 299. <i>Bouteloua disticha</i>.
 300. <i>Trachypogon gouini</i>.
 301. <i>Syntherisma sanguinalis</i>.
 302. <i>Paspalum conjugatum</i>.
 303. <i>Echinochloa colonum</i>.
 304. <i>Syntherisma sanguinalis</i>.
 305 (in part). <i>Panicum diffusum</i>.
 305 (in part). <i>Panicum distantiflorum</i>.
 306. <i>Valota insularis</i>.
 335. <i>Panicum elephantipes</i>.
 424. <i>Holcus halepensis</i>.
 425. <i>Echinochloa colonum</i>.
 427. <i>Panicum maximum</i>.
 428. <i>Chaetochloa geniculata</i>.
 554. <i>Dactyloctenium aegyptium</i>.
 555. <i>Chaetochloa verticillata</i>.</p> | <p>556. <i>Oplismenus hirtellus</i>.
 557. <i>Panicum trichanthum</i>.
 558. <i>Chloris radiata</i>.
 559. <i>Hymenachne amplexicaulis</i>.
 560. <i>Leptochloa virgata</i>.
 561. <i>Holcus sorghum</i>.
 562. <i>Andropogon gracilis</i>.
 563. <i>Panicum repens</i>.
 564. <i>Paspalum alterniflorum</i>.
 565. <i>Andropogon glomeratus</i>.
 566. <i>Panicum reptans</i>.
 567. <i>Panicum distantiflorum</i>.
 568. <i>Panicum barbinode</i>.
 569. <i>Gynerium sagittatum</i>.
 570. <i>Panicum adpersum</i>.
 571. <i>Paspalum denticulatum</i>.
 572. <i>Andropogon glomeratus</i>.
 573. <i>Panicum fasciculatum</i>.
 574. <i>Chloris ciliata</i>.
 575. <i>Sporobolus indicus</i>.
 576. <i>Panicum reptans</i>.
 577. <i>Hymenachne amplexicaulis</i>.
 578. <i>Paspalum virgatum</i>.
 579. <i>Paspalum paniculatum</i>.
 580. <i>Leptochloa filiformis</i>.
 581. <i>Paspalum alterniflorum</i>.
 583. <i>Olyra latifolia</i>.
 584. <i>Lithachne pauciflora</i>.
 585. <i>Paspalum alterniflorum</i>.
 586. <i>Sporobolus berterianus</i>.
 587. <i>Paspalum ciliiferum</i>.
 588. <i>Paspalum denticulatum</i>.
 743. <i>Leptochloa filiformis</i>.
 747. <i>Echinochloa sabulicola</i>.
 749. <i>Bouteloua disticha</i>.
 752. <i>Echinochloa colonum</i>.
 753. <i>Leptochloa fascicularis</i>.
 755. <i>Anatherum zizanioides</i>.
 759. <i>Paspalum racemosum</i>.
 760. <i>Poa annua</i>.
 766. <i>Lasiacis sloanei</i>.
 767. <i>Lasiacis divaricata</i>.
 768. <i>Paspalum caespitosum</i>.
 769a. <i>Panicum geminatum</i>.
 769b. <i>Panicum geminatum</i>.
 774. <i>Holcus sorghum</i>.
 775. <i>Arundo donax</i>.
 779. <i>Paspalum ciliatifolium</i>.
 780. <i>Bouteloua americana</i>.
 781. <i>Paspalum plicatulum</i>.
 782. <i>Paspalum conjugatum</i>.
 807. <i>Eragrostis tephrosanthos</i>.
 808. <i>Hymenachne auriculata</i>.</p> |
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809. *Avena sativa*.
 810. *Axonopus compressus*.
 810b. *Axonopus compressus*.
 811. *Paspalum vaginatum*.
 813. *Panicum fasciculatum*.
 814. *Syntherisma digitata*.
 815. *Anthephora hermaphrodita*.
 817. *Tricholaena rosea*.
 818. *Eragrostis amabilis*.
 820. *Andropogon gracilis*.
 821. *Andropogon glomeratus*.
 822. *Andropogon bicornis*.
 823. *Andropogon glomeratus*.
 824. *Andropogon virginicus*.
 825. *Andropogon gracilis*.
 826. *Andropogon gracilis*.
 827. *Andropogon leucostachyus*.
 828. *Chaetochloa onurus*.
 829. *Chaetochloa setosa*.
 830. *Chaetochloa setosa*.
 831. *Chaetochloa setosa*.
 832. *Chaetochloa geniculata*.
 833. *Chaetochloa geniculata*.
 834. *Chaetochloa geniculata*.
 835. *Cenchrus myosuroides*.
 836. *Cenchrus carolinianus*.
 837. *Cenchrus viridis*.
 838. *Cenchrus echinatus*.
 839. *Syntherisma digitata*.
 840. *Syntherisma sanguinalis*.
 841. *Syntherisma digitata*.
 842. *Syntherisma sanguinalis*.
 843. *Syntherisma sanguinalis*.
 843f. *Syntherisma sanguinalis*.
 844. *Echinochloa colonum*.
 845. *Bambos vulgaris*.
 846. *Capriola dactylon*.
 847. *Manisuris exaltata*.
 848. *Reynaudia filiformis*.
 849. *Leptochloa filiformis*.
 850. *Eriochloa punctata*.
 851. *Eriochloa filifolia*.
 852. *Eriochloa ramosa*.
 853. *Leptocoryphium lanatum*.
 854. *Andropogon semiberbis*.
 855. *Andropogon semiberbis*.
 856. *Chloris sagraeana*.
 856f. *Chloris ciliata*.
 857. *Chloris sagraeana*.
 858. *Chloris virgata*.
 859. *Chloris orthonotum*.
 860. *Chloris orthonotum*.
 861. *Bouteloua heterostega*.
 862. *Leptochloa domingensis*.
 863. *Leptochloa virgata*.
 863b. *Leptochloa domingensis*.
 864. *Leptochloa fascicularis*.
 865. *Leptochloa domingensis*.
 866. *Sporobolus indicus*.
 867. *Sporobolus indicus*.
 868. *Sporobolus argutus*.
 869. *Sporobolus indicus*.
 870. *Sporobolus indicus*.
 871. *Aristida curtifolia*.
 872. *Aristida curtifolia*.
 873. *Aristida curtifolia*.
 874. *Aristida curtifolia*.
 875. *Aristida refracta*.
 876. *Eragrostis tephrosanthos*.
 876b. *Eragrostis tephrosanthos*.
 877. *Eragrostis tephrosanthos*.
 878. *Eragrostis tephrosanthos*.
 879. *Eragrostis amabilis*.
 880. *Eragrostis ciliaris laxa*.
 882. *Eragrostis tephrosanthos*.
 884. *Eragrostis tephrosanthos*.
 885. *Eragrostis leonina*.
 886. *Eragrostis cubensis*.
 887. *Eragrostis tephrosanthos*.
 888. *Eragrostis tephrosanthos*.
 889. *Uniola paniculata*.
 890. *Bouteloua americana*.
 893. *Andropogon saccharoides*.
 894. *Sorghastrum parviflorum*.
 895. *Sorghastrum parviflorum*.
 896. *Chloris cruciata*.
 897. *Heteropogon contortus*.
 898. *Syntherisma leucocoma*.
 899. *Nazia aliena*.
 900. *Arthrostylidium capillifolium*.
 901. *Arthrostylidium capillifolium*.
 902. *Panicum exiguiflorum*.
 903. *Panicum zizanioides*.
 904. *Lasiacis divaricata*.
 905. *Lasiacis ruscifolia*.
 906. *Panicum reptans*.
 907. *Panicum laxum*.
 908. *Panicum pilosum*.
 909. *Panicum boliviense*.
 910. *Panicum reptans*.
 910b. *Panicum reptans*.
 910c. *Panicum reptans*.
 911. *Panicum exiguiflorum*.
 912. *Panicum distantiflorum*.
 913. *Panicum exiguiflorum*.
 914. *Panicum laxum*.

915. *Panicum maximum*.
 916. *Panicum fasciculatum*.
 917. *Panicum distantiflorum*.
 918. *Panicum geminatum*.
 919. *Panicum aquaticum*.
 920. *Panicum geminatum*.
 921. *Panicum maximum*.
 922. *Panicum ghiesbreghtii*.
 922b. *Panicum ghiesbreghtii*.
 923. *Panicum diffusum*.
 923b. *Panicum diffusum*.
 923c. *Panicum diffusum*.
 924. *Panicum adpersum*.
 925. *Panicum adpersum*.
 926. *Paspalum plicatulum*.
 927. *Paspalum plicatulum*.
 927b. *Paspalum plicatulum*.
 928. *Paspalum notatum*.
 929. *Paspalum distichum*.
 930. *Paspalum vaginatum*.
 931. *Paspalum millegrana*.
 931b. *Paspalum secans*.
 932. *Paspalum secans*.
 933. *Paspalum paniculatum*.
 934. *Paspalum ciliiferum*.
 935. *Paspalum caespitosum*.
 935c. *Paspalum poiretii*.
 936. *Paspalum caespitosum*.
 937. *Paspalum denticulatum*.
 938. *Paspalum conjugatum*.
 938d. *Paspalum conjugatum*.
 939b. *Paspalum conjugatum*.
 940. *Paspalum distichum*.
 941. *Paspalum distichum*.
 942. *Paspalum clavuliferum*.
 943. *Paspalum alterniflorum*.
 944. *Paspalum lindenianum*.
 945. *Paspalum alterniflorum*.
 945b. *Paspalum lindenianum*.
 946. *Paspalum filiforme*.
 947. *Paspalum unispicatum*.
 948. *Paspalum poiretii*.
 949. *Paspalum leoninum*.
 950. *Paspalum leoninum*.
 951. *Paspalum glabrum*.
 952. *Syntherisma panicea*.
 953. *Paspalum caespitosum*.
 954. *Paspalum simpsoni*.
 955. *Andropogon saccharoides*.
 956. *Paspalum bakeri*.
 957. *Panicum maximum*.
 958. *Aristida scabra*.
 959. *Aristida scabra*.
 960. *Syntherisma sanguinalis*.
 961. *Chloris petraea*.
 962. *Eragrostis prolifera*.
 963. *Eragrostis prolifera*.
 964. *Uniola paniculata*.
 1509. *Leptochloa fascicularis*.
 1510. *Homalocenchrus hexandrus*.
 1511. *Paspalum ciliiferum*.
 1513. *Syntherisma sanguinalis*.
 1514. *Syntherisma sanguinalis*.
 1522. *Sporobolus berterioanus*.
 1523. *Arundo donax*.
 1527. *Paspalum poiretii*.
 1528. *Sporobolus berterioanus*.
 1529. *Andropogon malacostachyus*.
 1581. *Anatherum zizanioides*.
 1582. *Imperata brasiliensis*.
 1583. *Lolium temulentum arvense*.
 1956. *Andropogon malacostachyus*.
 1964. *Chaetochloa geniculata*.
 1965. *Chloris sagraeana*.
 1969. *Lasiacis sloanei*.
 1970. *Lasiacis divaricata*.
 1971. *Lasiacis divaricata*.
 1972. *Lasiacis grisebachii*.
 1973. *Lasiacis sloanei*.
 1974. *Panicum aquaticum*.
 1975. *Panicum aquaticum*.
 1975½. *Panicum dichotomiflorum*.
 1976. *Panicum aquaticum*.
 1977. *Panicum pilosum*.
 1978. *Panicum adpersum*.
 1979. *Panicum fasciculatum*.
 1980. *Panicum reptans*.
 1984. *Paspalum conjugatum*.
 1986. *Paspalum pubiflorum*.
 1987. *Paspalum millegrana*.
 1989. *Paspalum plicatulum*.
 1990. *Paspalum virgatum*.
 1991. *Paspalum distichum*.
 1992. *Paspalum distichum*.
 1995. *Paspalum virgatum*.
 1996. *Paspalum breve*.
 1997. *Paspalum breve*.
 1999. *Pharus latifolius*.
 2000. *Sporobolus indicus*.
 2001. *Sporobolus berterioanus*.
 2002. *Syntherisma digitata*.
 2004. *Syntherisma sanguinalis*.
 2006. *Syntherisma sanguinalis*.
 2007. *Hymenachne amplexicaulis*.
 2009. *Hymenachne amplexicaulis*.
 2010. *Pappophorum alopecuroideum*.

2011. *Muhlenbergia capillaris*.
 2013. *Andropogon caricosus*.
 2014. *Gouinia virgata*.
 2017. *Antheophora hermaphrodita*.
 2018. *Axonopus compressus*.
 2019. *Leptochloa virgata*.
 2020. *Leptochloa fascicularis*.
 2381. *Paspalum caespitosum*.
 2382. *Panicum distantiflorum*.
 2389. *Andropogon caricosus*.
 2391. *Cenchrus carolinianus*.
 2401. *Paspalum unispicatum*.
 2532. *Panicum diffusum*.
 2556. *Paspalum alterniflorum*.
 2557. *Andropogon saccharoides*.
 2559. *Panicum diffusum*.
 2560. *Chloris sagraeana*.
 2561. *Paspalum alterniflorum*.
 2602. *Lasiacis divaricata*.
 2604. *Cenchrus viridis*.
 2614. *Paspalum distachyon*.
 2625. *Paspalum bakeri*.
 2639. *Paspalum virgatum*.
 2641. *Aristida refracta*.
 2642. *Paspalum distichum*.
 2674. *Panicum ghiesbreghtii*.
 2683. *Manisuris exaltata*.
 2686. *Eriochloa punctata*.
 2687. *Eriochloa filifolia*.
 2691. *Paspalum leoninum*.
 2738. *Paspalum propinquum*.
 2743. *Panicum zizanioides*.
 2774. *Panicum dichotomiflorum*.
 2775. *Panicum dichotomiflorum*.
 2783. *Paspalum distachyon*.
 2784. *Holcus sorghum*.
 2785. *Echinochloa sabulicola*.
 2786. *Eragrostis amabilis*.
 2787. *Andropogon bicornis*.
 2788. *Cymbopogon hirtus*.
 2791. *Andropogon semiberbis*.
 2792. *Heteropogon contortus*.
 2823. *Aristida refracta*.
 2869. *Panicum reptans*.
 2870. *Paspalum millegrana*.
 2871. *Panicum maximum*.
 2873. *Ichnanthus nemorosus*.
 2874. *Lasiacis grisebachii*.
 2875. *Aristida curtifolia*.
 2876. *Andropogon fastigiatus*.
 2877. *Andropogon semiberbis*.
 3397. *Andropogon tener*.
 3398. *Trachypogon filifolius*.
 3441. *Syntherisma sanguinalis*.
 3443. *Aristida scabra*.
 3444. *Eragrostis prolifera*.
 3445. *Cenchrus carolinianus*.
 3446. *Paspalum glabrum*.
 3448. *Eriochloa punctata*.
 3449. *Panicum diffusum*.
 3450. *Ichnanthus mayarensis*.
 3451. *Andropogon fastigiatus*.
 3453. *Cenchrus carolinianus*.
 3454. *Paspalum plicatulum*.
 3455. *Aristida curtifolia*.
 3456. *Chaetochloa onurus*.
 3457. *Paspalum lindenianum*.
 3459. *Andropogon leucostachyus*.
 3461. *Chloris virgata*.
 3462. *Paspalum plicatulum*.
 3465. *Leptocoryphium lanatum*.
 3466. *Panicum albomarginatum*.
 3467. *Sporobolus brasiliensis*.
 3468. *Homalocenchrus monandrus*.
 3469. *Mesosetum loliforme*.
 3470. *Paspalum plicatulum*.
 3471. *Eragrostis cubensis*.
 3472. *Panicum acuminatum*.
 3473. *Paspalum alterniflorum*.
 3474. *Panicum reptans*.
 3476. *Distichlis spicata*.
 3477. *Paspalum breve*.
 3478. *Paspalum propinquum*.
 3479. *Bouteloua heterostega*.
 3480. *Reynaudia filiformis*.
 3482. *Paspalum leoninum*.
 3635. *Ichnanthus nemorosus*.
 3676. *Paspalum caespitosum*.
 3678. *Eragrostis prolifera*.
 3694. *Paspalum poiretii*.
 3701. *Paspalum caespitosum*.
 3702. *Sporobolus virginicus*.
 3726. *Eragrostis pilosa*.
 3747. *Panicum ghiesbreghtii*.
 3775. *Chaetochloa setosa*.
 3776. *Chaetochloa setosa*.
 3778. *Lasiacis ruscifolia*.
 3779. *Homalocenchrus monandrus*.
 3781. *Paspalum paniculatum*.
 3783. *Panicum ghiesbreghtii*.
 3788. *Andropogon bicornis*.
 3790. *Panicum glutinosum*.
 3825. *Arthrostylidium sarmentosum*.
 3907. *Pharus glaber*.
 3908. *Ichnanthus nemorosus*.
 3911. *Leptochloa fascicularis*.

3913. *Panicum hirsutum*.
 3946. *Chaetochloa setosa*.
 3962. *Paspalum virgatum*.
 3963. *Cenchrus viridis*.
 3964. *Chloris virgata*.
 3965. *Eragrostis pilosa*.
 3966. *Panicum fasciculatum*.
 3973. *Arundinella deppeana*.
 3978. *Paspalum paniculatum*.
 3980. *Paspalum poiretii*.
 3982. *Panicum pilosum*.
 3982½. *Panicum laxum*.
 3990. *Olyra latifolia*.
 3997. *Ichnanthus nemorosus*.
 3998. *Panicum glutinosum*.
 4000. *Pharus parvifolius*.
 4009. *Arundinella berteroniana*.
 4026. *Arthrostylidium multispicatum*.
 4094. *Andropogon hirtiflorus*.
 4095. *Heteropogon contortus*.
 4097. *Andropogon saccharoides*.
 4098. *Rytilix granularis*.
 4099. *Paspalum unispicatum*.
 4100. *Paspalum breve*.
 4101. *Andropogon saccharoides*.
 4105. *Panicum trichoides*.
 4139. *Oplismenus setarius*.
 4140. *Mniochloa strephioides*.
 4141. *Panicum condensum*.
 4143. *Ichnanthus mayarensis*.
 4145. *Chaetochloa onurus*.
 4146. *Tricholaena rosea*.
 4147. *Bouteloua heterostega*.
 4151. *Pappophorum alopecuroideum*.
 4155. *Panicum aquaticum*.
 4157. *Paspalum millegrana*.
 4160. *Paspalum millegrana*.
 4168. *Echinochloa spectabilis*.
 4182. *Chaetochloa geniculata*.
 4183. *Paspalum cilliferum*.
 4184. *Hymenachne amplexicaulis*.
 4190. *Panicum barbinode*.
 4191. *Homalocenchrus hexandrus*.
 4192. *Hymenachne amplexicaulis*.
 4193. *Luziola spruceana*.
 4262. *Imperata brasiliensis*.
 4315. *Eriochloa punctata*.
 4332. *Syntherisma serotina*.
 4333. *Paspalum plicatulum*.
 4354. *Eragrostis tephrosanthos*.
 4362. *Panicum ghiesbreghtii*.
 4363. *Paspalum plicatulum*.
 4364. *Paspalum millegrana*.
 4366. *Paspalum virgatum*.
 4366½. *Paspalum secans*.
 4367. *Paspalum virgatum*.
 4371. *Panicum acuminatum*.
 4383. *Achlaena piptostachya*.
 4391. *Mniochloa strephioides*.
 4413. *Paspalum distichum*.
 4430. *Paspalum conjugatum*.
 4432. *Panicum trichoides*.
 4439. *Syntherisma curvinervis*.
 4446. *Arthrostylidium urbanii*.
 4447. *Panicum laxum*.
 4453. *Andropogon nashianus*.
 4454. *Panicum albomarginatum*.
 4461. *Paspalum plicatulum*.
 4468. *Paspalum minus*.
 4522. *Brachiaria platyphylla*.
 4526. *Paspalum notatum*.
 4557. *Paspalum plicatulum*.
 4558. *Panicum acuminatum*.
 4559. *Eragrostis cubensis*.
 4560. *Andropogon nashianus*.
 4563. *Lasiacis sloanei*.
 4564. *Leptocoryphium lanatum*.
 4569. *Paspalum decumbens*.
 4570. *Paspalum nanum*.
 4572. *Mniochloa strephioides*.
 4593. *Mniochloa strephioides*.
 4595. *Panicum millegrana*.
 4601. *Panicum ghiesbreghtii*.
 4602. *Panicum millegrana*.
 4635. *Paspalum denticulatum*.
 4640. *Rytilix granularis*.
 4645. *Aristida curtifolia*.
 4646. *Aristida refracta*.
 4662. *Lasiacis divaricata*.
 4664. *Paspalum poiretii*.
 4681. *Hymenachne amplexicaulis*.
 4715. *Syntherisma argillacea*.
 4716. *Andropogon saccharoides*.
 4718. *Aristida refracta*.
 4719. *Andropogon fastigiatus*.
 4720. *Oplismenus setarius*.
 4725. *Bouteloua americana*.
 4753. *Cenchrus echinatus*.
 4783. *Chloris sagraeana*.
 4784. *Panicum utowanaeum*.
 4785. *Syntherisma argillacea*.
 4786. *Chloris cruciata*.
 4787. *Chloris sagraeana*.
 4788. *Chloris cruciata*.
 4789. *Bouteloua americana*.
 4792. *Bouteloua heterostega*.

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| 4807. <i>Chloris sagraeana</i> . | 5460. <i>Panicum boliviense</i> . |
| 4829. <i>Panicum strigosum</i> . | 5467. <i>Sporobolus argutus</i> . |
| 4833. <i>Panicum acuminatum</i> . | 5468. <i>Sporobolus indicus</i> . |
| 4834. <i>Panicum acuminatum</i> . | 5582. <i>Paspalum unispicatum</i> . |
| 4835. <i>Panicum chrysopsidifolium</i> . | 5602. <i>Paspalum poiretii</i> . |
| 4836. <i>Panicum millegrana</i> . | 5603. <i>Panicum utowanaeum</i> . |
| 4837. <i>Panicum acuminatum</i> . | 5604. <i>Paspalum ciliatifolium</i> . |
| 4840. <i>Panicum chrysopsidifolium</i> . | 5605. <i>Aristida refracta</i> . |
| 4841. <i>Panicum acuminatum</i> . | 5606. <i>Aristida refracta</i> . |
| 4843. <i>Isachne leersioides</i> . | 5607. <i>Eriochloa filifolia</i> . |
| 4844. <i>Aristida curtifolia</i> . | 5608. <i>Panicum exiguiiflorum</i> . |
| 4845. <i>Aristida refracta</i> . | 5618. <i>Cenchrus viridis</i> . |
| 4846. <i>Aristida refracta</i> . | 5620. <i>Eragrostis prolifera</i> . |
| 4847. <i>Arundinella deppeana</i> . | 5631. <i>Sporobolus virginicus</i> . |
| 4848. <i>Brachiaria platyphylla</i> . | 5634. <i>Cenchrus carolinianus</i> . |
| 4849. <i>Ichnanthus pallens</i> . | 5650. <i>Eragrostis prolifera</i> . |
| 4851. <i>Andropogon virginicus</i> . | 5651. <i>Eragrostis prolifera</i> . |
| 4852. <i>Aristida erecta</i> . | 5656. <i>Sporobolus littoralis</i> . |
| 4853. <i>Arthrostylidium capillifolium</i> . | 5680. <i>Paspalum alterniflorum</i> . |
| 4854. <i>Arthrostylidium capillifolium</i> . | 5681. <i>Panicum diffusum</i> . |
| 4855. <i>Chloris sagraeana</i> . | 5682. <i>Imperata contracta</i> . |
| 4856. <i>Paspalum minus</i> . | 5683. <i>Cenchrus viridis</i> . |
| 4857. <i>Paspalum filiforme</i> . | 5684. <i>Chaetochloa onurus</i> . |
| 4858. <i>Paspalum clavuliferum</i> . | 5685. <i>Lasiacis grisebachii</i> . |
| 5015. <i>Aristida curtifolia</i> . | 5702. <i>Panicum aquaticum</i> . |
| 5052. <i>Lolium temulentum arvense</i> . | 5748. <i>Hymenachne amplexicaulis</i> . |
| 5062. <i>Panicum condensum</i> . | 5749. <i>Homalocenchrus hexandrus</i> . |
| 5075. <i>Paspalum conjugatum</i> . | 5750. <i>Sacciolepis striata</i> . |
| 5077. <i>Andropogon annulatus</i> . | 5754. <i>Panicum virgatum cubense</i> . |
| 5078. <i>Isachne leersioides</i> . | 5755. <i>Panicum virgatum cubense</i> . |
| 5085. <i>Andropogon gracilis</i> . | 5756. <i>Muhlenbergia capillaris</i> . |
| 5148. <i>Lasiacis sloanei</i> . | 5757. <i>Distichlis spicata</i> . |
| 5167. <i>Paspalum notatum</i> . | 5758. <i>Sporobolus virginicus</i> . |
| 5168. <i>Andropogon gracilis</i> . | 5818. <i>Andropogon tener</i> . |
| 5174. <i>Panicum laxum</i> . | 5821. <i>Andropogon glomeratus</i> . |
| 5177. <i>Panicum chrysopsidifolium</i> . | 5823. <i>Panicum aquaticum</i> . |
| 5212. <i>Chaetochloa geniculata</i> . | 5827. <i>Leptocoryphium lanatum</i> . |
| 5213. <i>Aristida curtifolia</i> . | 5830. <i>Aristida refracta</i> . |
| 5270. <i>Eragrostis prolifera</i> . | 5834. <i>Aristida curtifolia</i> . |
| 5272. <i>Paspalum lindenianum</i> . | 5835. <i>Chaetochloa geniculata</i> . |
| 5275. <i>Arthrostylidium cubense</i> . | 5836. <i>Andropogon brevifolius</i> . |
| 5276. <i>Aristida refracta</i> . | 5840. <i>Panicum fusiforme</i> . |
| 5277. <i>Andropogon saccharoides</i> . | 5841. <i>Cymbopogon hirtus</i> . |
| 5301. <i>Andropogon saccharoides</i> . | 5843. <i>Syntherisma argillacea</i> . |
| 5302. <i>Andropogon virginicus</i> . | 5844. <i>Paspalum plicatulum</i> . |
| 5356. <i>Heteropogon contortus</i> . | 5846. <i>Panicum laxum</i> . |
| 5357. <i>Andropogon saccharoides</i> . | 5850. <i>Paspalum reptatum</i> . |
| 5364. <i>Paspalum plicatulum</i> . | 5856. <i>Panicum tenerum</i> . |
| 5365. <i>Sorghastrum parviflorum</i> . | 5863. <i>Aristida refracta</i> . |
| 5400. <i>Andropogon virginicus</i> . | 5864. <i>Andropogon brevifolius</i> . |
| 5402. <i>Panicum stenodes</i> . | 5867. <i>Mesosetum loliforme</i> . |
| 5406. <i>Panicum lancearium</i> . | 5868. <i>Panicum stenodes</i> . |
| 5407. <i>Andropogon leucostachyus</i> . | 5870. <i>Cymbopogon hirtus</i> . |

5874. *Aristida refracta*.
 5880. *Sporobolus indicus*.
 5884. *Eragrostis elliotii*.
 5886. *Ischaemum rugosum*.
 5890. *Panicum laxum*.
 5892. *Panicum laxum*.
 5898. *Panicum nitidum*.
 5904. *Echinochloa colonum*.
 5906. *Panicum boliviense*.
 5916. *Arundinella deppeana*.
 5941. *Luziola peruviana*.
 5944. *Homalocenchrus hexandrus*.
 5972. *Andropogon virginicus*.
 5977. *Panicum tenerum*.
 5984. *Panicum laxum*.
 5994. *Andropogon semiberbis*.
 5998. *Panicum aquaticum*.
 6004. *Panicum laxum*.
 6005. *Panicum ghiesbreghtii*.
 6006. *Panicum maximum*.
 6007. *Cenchrus viridis*.
 6008. *Andropogon saccharoides*.
 6009. *Paspalum filiforme*.
 6026. *Paspalum plicatulum*.
 6045. *Panicum stenodes*.
 6142. *Panicum aquaticum*.
 6152. *Panicum caerulescens*.
 6185. *Sporobolus argutus*.
 6204. *Paspalum distichum*.
 6222. *Andropogon leucostachyus*.
 6299. *Panicum distantiflorum*.
 6313. *Panicum laxum*.
 6321. *Paspalum ciliiferum*.
 6326. *Andropogon tener*.
 6353. *Pharus glaber*.
 6354. *Paspalum simpsoni*.
 6361. *Tricholaena rosea*.
 6372. *Panicum utowanaeum*.
 6373. *Ichnanthus mayarensis*.
 6374. *Aristida refracta*.
 6377. *Panicum exiguiiflorum*.
 6416. *Panicum tenerum*.
 6417. *Paspalum clavuliferum*.
 6418. *Paspalum clavuliferum*.
 6419. *Paspalum plicatulum*.
 6420. *Paspalum densum*.
 6421. *Leptochloa filiformis*.
 6422. *Panicum chrysopsidifolium*.
 6423. *Paspalum notatum*.
 6424. *Andropogon selloanus*.
 6425. *Eragrostis elliotii*.
 6426. *Aristida refracta*.
 6427. *Panicum laxum*.
 6428. *Andropogon selloanus*.
 6429. *Panicum ghiesbreghtii*.
 6430. *Mesosetum wrightii*.
 6431. *Andropogon leucostachyus*.
 6432. *Andropogon tener*.
 6434. *Chloris virgata*.
 6457. *Panicum jorii*.
 6515. *Panicum boliviense*.
 6520. *Isachne leersioides*.
 6524. *Ichnanthus pallens*.
 6525. *Arundinella confinis*.
 6529. *Andropogon leucostachyus*.
 6539. *Chaetochloa geniculata*.
 6574. *Panicum boliviense*.
 6595. *Panicum jorii*.
 6606. *Panicum boliviense*.
 6620. *Panicum glutinosum*.
 6621. *Olyra latifolia*.
 6652. *Andropogon gracilis*.
 6654. *Panicum exiguiiflorum*.
 6655. *Paspalum clavuliferum*.
 6656. *Andropogon virginicus*.
 6661. *Paspalum filiforme*.
 6663. *Rytidix granularis*.
 6730. *Isachne leersioides*.
 6732. *Eragrostis glutinosa*.
 6734. *Paspalum vaginatum*.
 6735. *Paspalum millegrana*.
 6743. *Paspalum secans*.
 6745. *Syntherisma panicea*.
 6901. *Saugetia fasciculata*.
 6902. *Panicum acuminatum*.
 6903. *Panicum leucothrix*.
 6911. *Andropogon fastigiatus*.
 6918. *Aristida erecta*.
 6919. *Panicum tenerum*.
 6923. *Sporobolus purpurascens*.
 6936. *Paspalum pulchellum*.
 6941. *Cenchrus distichophyllus*.
 6942. *Aristida gyrans*.
 6943. *Panicum albomarginatum*.
 6944. *Panicum parvifolium*.
 6948. *Panicum exiguiiflorum*.
 6952. *Panicum boliviense*.
 6971. *Aristida refracta*.
 6981. *Manisuris leonina*.
 6984. *Sporobolus purpurascens*.
 6988. *Andropogon virgatus*.
 6989. *Paspalum notatum*.
 6998. *Panicum stenodes*.
 7004. *Panicum exiguiiflorum*.
 7005. *Panicum chrysopsidifolium*.
 7006. *Panicum albomarginatum*.

7007. *Panicum fusiforme*.
 7008. *Panicum exiguiflorum*.
 7009. *Panicum albomarginatum*.
 7030. *Aristida curtifolia*.
 7031. *Aristida refracta*.

LEÓN, BROTHER, AND EKMAN, E. L.

4265. *Phalaris canariensis*.
 4268. *Eragrostis hypnoides*.
 4269. *Eragrostis hypnoides*.

LEÓN, BROTHER, AND SHAFER, J. A.

3443. *Aristida scabra*.
 3467. *Sporobolus brasiliensis*.
 13635. *Panicum zizanioides*.
 13670. *Paspalum minus*.
 13717. *Panicum cayennense*.
 13719. *Panicum acuminatum*.

LIEBMANN, F. M.

166. *Paspalum secans*.
 194. *Paspalum alterniflorum*.
 201. *Paspalum alterniflorum*.
 216. *Syntherisma digitata*.
 232. *Capriola dactylon*.
 233. *Capriola dactylon*.
 234. *Capriola dactylon*.
 235. *Chloris petraea*.
 249. *Leptochloa virgata*.
 250. *Leptochloa virgata*.
 259. *Olyra latifolia*.
 264. *Olyra latifolia*.
 347. *Chaetochloa verticillata*.
 348. *Chaetochloa verticillata*.
 376. *Echinochloa colonum*.
 378. *Echinochloa sabulicola*.
 445. *Panicum maximum*.
 446. *Panicum maximum*.
 469. *Cenchrus echinatus*.
 699. *Sporobolus argutus*.

LINDEN, J. J.

1811. *Pharus latifolius*.
 1813. *Paspalum lindenianum*.
 1815. *Eleusine indica*.
 1816. *Syntherisma digitata*.
 1818. *Andropogon saccharoides*.
 1819. *Capriola dactylon*.
 2143. *Panicum glutinosum*.

LLOYD, C. G.

1030. *Lasiacis sorghoidea*.
 1033. *Paspalum fimbriatum*.

1034. *Chloris radiata*.
 1035. *Lasiacis sloanei*.
 1115. *Syntherisma digitata*.
 1116. *Panicum fasciculatum*.
 1118. *Antheophora hermaphrodita*.
 1119. *Eragrostis ciliaris*.
 1120. *Eleusine indica*.

MAXON, W. R.

726. *Cenchrus echinatus*.
 766. *Chloris paraguayensis*.
 768. *Paspalum fimbriatum*.
 1198. *Senites zeugites*.
 1448. *Poa annua*.
 1459. *Briza minor*.
 1629. *Leptochloa virgata*.
 1640. *Cenchrus viridis*.
 1642. *Paspalum fimbriatum*.
 1644. *Cenchrus echinatus*.
 1645. *Valota insularis*.
 1655. *Sporobolus indicus*.
 1658. *Leptochloa filiformis*.
 1659. *Panicum fasciculatum*.
 1661. *Eleusine indica*.
 1967. *Sporobolus indicus*.
 2003. *Chaetochloa geniculata*.
 2109. *Panicum zizanioides*.
 2182. *Pharus glaber*.
 2187. *Phragmites phragmites*.
 2215. *Pharus glaber*.
 2361. *Panicum fasciculatum*.
 2363. *Paspalum conjugatum*.
 2367. *Olyra latifolia*.
 2368. *Chaetochloa geniculata*.
 2540. *Andropogon bicornis*.
 2652. *Briza minor*.
 2673. *Senites zeugites*.
 2800. *Andropogon bicornis*.
 2811. *Andropogon glomeratus*.
 2812. *Paspalum plicatulum*.
 2816. *Panicum glutinosum*.
 2940. *Andropogon bicornis*.
 2945. *Andropogon glomeratus*.
 2951. *Oplismenus hirtellus*.
 2980. *Paspalum virgatum*.
 4155. *Pharus parvifolius*.
 4487a. *Arthrostylidium sarmentosum*.

MILLSPAUGH, C. F.

15. *Stenotaphrum secundatum*.
 45. *Chaetochloa geniculata*.
 50. *Chaetochloa geniculata*.

88. *Sporobolus berterianus*.
 99. *Chaetochloa verticillata*.
 125. *Capriola dactylon*.
 126. *Panicum dichotomiflorum*.
 127. *Chaetochloa verticillata*.
 163. *Cenchrus echinatus*.
 214. *Echinochloa colonum*.
 215. *Chloris radiata*.
 233. *Coix lachryma-jobi*.
 256. *Dactyloctenium aegyptium*.
 321. *Eragrostis ciliaris*.
 324. *Panicum barbinode*.
 333. *Syntherisma digitata*.
 335. *Echinochloa colonum*.
 352. *Ichnanthus pallens*.
 359. *Capriola dactylon*.
 368. *Valota insularis*.
 385. *Valota insularis*.
 410. *Chloris paraguayensis*.
 438. *Cenchrus echinatus*.
 441. *Chloris paraguayensis*.
 454. *Panicum maximum*.
 519. *Lasiacis divaricata*.
 520. *Lasiacis sorghoidea*.
 539. *Valota insularis*.
 569. *Echinochloa colonum*.
 573. *Chloris paraguayensis*.
 592. *Chloris paraguayensis*.
 619. *Cenchrus viridis*.
 702. *Panicum utowanense*.
 726. *Panicum reptans*.
 727. *Panicum barbinode*.
 732. *Echinochloa colonum*.
 733. *Chloris paraguayensis*.
 737. *Eleusine indica*.
 738. *Dactyloctenium aegyptium*.
 808. *Cenchrus viridis*.
 863. *Syntherisma sanguinalis*.
 891. *Chloris radiata*.
 924. *Oplismenus hirtellus*.
 936. *Sporobolus berterianus*.
 944. *Paspalum fimbriatum*.
 976. *Coix lachryma-jobi*.
 1015. *Lasiacis divaricata*.
 1062. *Eragrostis ciliaris*.
 1064. *Chloris paraguayensis*.
 1110. *Cenchrus echinatus*.
 1111. *Eleusine indica*.
 1153. *Valota insularis*.
 1162. *Cenchrus carolinianus*.
 1190. *Eragrostis ciliaris*.
 1224. *Holcus sorghum*.
 1226. *Lasiacis divaricata*.

1240. *Eragrostis prolifera*.
 1249. *Cenchrus carolinianus*.
 1255. *Chloris petraea*.
 1267. *Dactyloctenium aegyptium*.
 1268. *Cenchrus viridis*.
 1269. *Antheophora hermaphrodita*.
 1270. *Eleusine indica*.
 1271. *Chloris polydactyla*.
 1408. *Paspalum simpsoni*.
 1422. *Lasiacis divaricata*.
 1459. *Stenotaphrum secundatum*.
 1859. *Panicum pilosum*.
 1907. *Paspalum paniculatum*.
 1915. *Hymenachne amplexicaulis*.
 1968. *Lasiacis sorghoidea*.
 9012. *Eragrostis ciliaris*.
 9234. *Eragrostis ciliaris*.
 9268. *Eragrostis ciliaris*.
 9339. *Eragrostis ciliaris*.
 9341. *Eragrostis ciliaris*.

MOORE, J. C.

17. *Cenchrus echinatus*.

NASH, G. V.

1780. *Eragrostis prolifera*.

NASH, G. V., AND TAYLOR, N.

926. *Aristida scabra*.
 956. *Paspalum secans*.
 1217. *Eragrostis bahamensis*.
 1353. *Paspalum glabrum*.
 1372. *Eragrostis ciliaris*.
 1482. *Pharus parvifolius*.
 3846. *Eragrostis ciliaris*.

NICHOLS, G. E.

37. *Chaetochloa palmifolia*.
 40. *Briza minor*.
 115. *Senites zeugites*.
 168. *Chusquea abietifolia*.
 190. *Pharus latifolius*.
 202. *Paspalum conjugatum*.

OTHMER, B.

385. *Lasiacis ruscifolia*.

OTTO, C. F. E.

268. *Arundinella deppeana*.

PALMER, E.

374. *Eragrostis amabilis*.

PALMER, W., AND RILEY, J. H.

12. *Oplismenus hirtellus*.
 13. *Eragrostis ciliaris*.
 70. *Arundinella deppenana*.
 86. *Andropogon bicornis*.
 95. *Andropogon bicornis*.
 97. *Paspalum virgatum*.
 105. *Lithachne pauciflora*.
 115. *Olyra latifolia*.
 123. *Pharus glaber*.
 130. *Ichnanthus pallens*.
 142. *Coix lachryma-jobi*.
 146. *Oplismenus hirtellus*.
 178. *Panicum maximum*.
 179a. *Paspalum paniculatum*.
 185. *Eragrostis ciliaris*.
 213. *Panicum strigosum*.
 216. *Olyra latifolia*.
 218. *Ichnanthus pallens*.
 260. *Pharus glaber*.
 349. *Sporobolus indicus*.
 377. *Panicum maximum*.
 404. *Sporobolus indicus*.
 440. *Leptocoryphium lanatum*.
 441. *Eragrostis elliottii*.
 447. *Panicum acuminatum*.
 472. *Imperata brasiliensis*.
 473. *Sporobolus indicus*.
 480. *Andropogon leucostachyus*.
 481. *Panicum chrysopsidifolium*.
 541. *Paspalum conjugatum*.
 542. *Panicum maximum*.
 543. *Leptochloa virgata*.
 544. *Paspalum paniculatum*.
 545. *Panicum maximum*.
 546. *Chaetochloa geniculata*.
 616. *Gynerium sagittatum*.
 627. *Sporobolus indicus*.
 628. *Paspalum virgatum*.
 664. *Holcus halepensis*.
 665. *Cenchrus echinatus*.
 679. *Cenchrus echinatus*.
 725. *Chloris paraguayensis*.
 736. *Sporobolus virginicus*.
 746. *Panicum adspersum*.
 751. *Uniola paniculata*.
 756. *Echinochloa colonum*.
 759. *Stenotaphrum secundatum*.

771. *Panicum adspersum*.
 781. *Cenchrus echinatus*.
 802. *Panicum diffusum*.
 813 (in part). *Paspalum secans*.
 813 (in part). *Paspalum virgatum*.
 815. *Holcus halepensis*.
 816. *Panicum maximum*.
 817. *Eleusine indica*.
 822. *Stenotaphrum secundatum*.
 848. *Paspalum vaginatum*.
 889. *Mesosetum loliiforme*.
 904. *Lasiacis ruscifolia*.
 913. *Achlaena piptostachya*.
 947. *Paspalum plicatulum*.
 948. *Eragrostis elliottii*.
 949. *Paspalum lindenianum*.
 955. *Sporobolus virginicus*.
 969. *Chloris petraea*.
 972. *Leptocoryphium lanatum*.
 978. *Paspalum minus*.
 982. *Panicum chrysopsidifolium*.
 986. *Mesosetum loliiforme*.
 989. *Panicum acuminatum*.
 990. *Panicum polycaulon*.
 995. *Aristida gyrans*.
 1000. *Chaetochloa setosa*.
 1001. *Lasiacis divaricata*.
 1008. *Stenotaphrum secundatum*.
 1057. *Paspalum virgatum*.
 1058. *Olyra latifolia*.
 1065. *Panicum viscidellum*.
 1066. *Olyra latifolia*.
 1069. *Panicum laxum*.
 1083. *Panicum acuminatum*.
 1084. *Rytilix granularis*.
 1086. *Panicum cayennense*.
 1092. *Rytilix granularis*.
 1119. *Paspalum notatum*.
 1121. *Sporobolus indicus*.
 1122. *Sporobolus virginicus*.
 1125. *Andropogon bicornis*.
 1134. *Panicum virgatum cubense*.
 1137. *Echinochloa colonum*.
 1146. *Cenchrus carolinianus*.
 1150. *Chloris paraguayensis*.

PAULSEN, O.

313. *Paspalum vaginatum*.

PICARDA, PÈRE.

1019. *Poa compressa*.
 1523. *Senites haitiensis*.

1554. *Aristida gyrans*.
1634. *Sorghastrum parviflorum*.
1654. *Panicum hirticaule*.

POLLARD, C. L., PALMER, E., AND
PALMER, W.

15. *Ichnanthus pallens*.
19. *Panicum reptans*.
53. *Olyra latifolia*.
76. *Lasiacis divaricata*.
273. *Leptochloa virgata*.
283. *Panicum maximum*.
284. *Cenchrus viridis*.

POLLARD, C. L., AND PALMER, W.

350. *Valota insularis*.

PÖPPIG, E.

7. *Sporobolus virginicus*.

PREY, N.

64. *Stenotaphrum secundatum*.

PRINGLE, C. G.

26. *Panicum barbinode*.
45. *Echinochloa colonum*.
54. *Lithachne pauciflora*.
62. *Leptochloa virgata*.
70. *Olyra latifolia*.
73. *Panicum reptans*.
74. *Panicum fasciculatum*.
76. *Oplismenus hirtellus*.
124. *Panicum fasciculatum*.

PURDIE, W.

26. *Olyra ciliatifolia*.

RAUNKIAER, C.

634. *Cenchrus carolinianus*.

RICKSECKER, A. E.

3. *Eleusine indica*.
13. *Coix lachryma-jobi*.
31. *Echinochloa colonum*.
33. *Eragrostis ciliaris*.
42. *Chloris ciliata*.

43. *Eleusine indica*.
44. *Chloris radiata*.
45. *Syntherisma digitata*.
46. *Dactyloctenium aegyptium*.
56. *Axonopus compressus*.
64. *Aristida adscensionis*.
66. *Panicum adpersum*.
67. *Chaetochloa rariflora*.
71. *Sporobolus berterioanus*.
77. *Panicum reptans*.
78. *Bouteloua americana*.
105. *Stenotaphrum secundatum*.
106. *Echinochloa colonum*.
111. *Holcus sorghum*.
124. *Cenchrus echinatus*.
142. *Valota insularis*.
148. *Eragrostis ciliaris*.
200. *Panicum maximum*.
209. *Andropogon pertusus panormi-*
tanus.
212. *Panicum geminatum*.
221. *Eragrostis barrelieri*.
222. *Eragrostis pilosa*.
223. *Paspalum conjugatum*.
238. *Paspalum fimbriatum*.
243. *Chaetochloa geniculata*.
250. *Oplismenus setarius*.
253 (in part). *Antheophora hermaph-*
rodita.
253 (in part). *Bambos vulgaris*.
256. *Capriola dactylon*.
257. *Lasiacis divaricata*.
258 (in part). *Leptochloa virgata*.
258 (in part). *Leptochloa filiformis*.
279. *Sporobolus argutus*.
289. *Lasiacis sorghoidea*.
290. *Sporobolus maralis*.
300. *Panicum barbinode*.
306. *Leptochloa fascicularis*.
317. *Panicum fasciculatum*.
381. *Nazia aliena*.
383. *Chaetochloa geniculata*.
384. *Panicum adpersum*.
390. *Nazia aliena*.
391. *Sporobolus berterioanus*.
393. *Capriola dactylon*.
396. *Valota insularis*.
400b. *Lasiacis divaricata*.
407. *Chaetochloa setosa*.
408. *Sporobolus virginicus*.
410. *Paspalum glabrum*.
413. *Panicum maximum*.
415. *Stenotaphrum secundatum*.

433. *Paspalum distichum*.
 434. *Paspalum secans*.
 443. *Cenchrus echinatus*.
 457. *Syntherisma sanguinalis*.
 467. *Eriochloa punctata*.
 480. *Pharus glaber*.

ROSE, J. N.

3184. *Panicum maximum*.
 3189. *Aristida cognata*.

ROSE, J. N., FITCH, W. R., AND RUSSELL, P. G.

3211. *Aristida adscensionis*.
 3236. *Dactyloctenium aegyptium*.
 3266. *Valota insularis*.
 3286. *Andropogon bicornis*.
 3377. *Chloris paraguayensis*.
 3382. *Andropogon nodosus*.
 3391. *Chaetochloa barbata*.
 3392. *Lasiacis divaricata*.
 3398. *Valota insularis*.
 3409. *Paspalum fimbriatum*.
 3412. *Cenchrus echinatus*.
 3415. *Andropogon nodosus*.
 3421. *Pharus glaber*.
 3427. *Andropogon bicornis*.
 3451. *Leptochloa virgata*.
 3452. *Panicum maximum*.
 3453. *Lasiacis sorghoidea*.
 3484. *Lasiacis sorghoidea*.
 3485. *Oplismenus setarius*.
 3486. *Lithachne pauciflora*.
 3487. *Ichnanthus pallens*.
 3493. *Lasiacis sorghoidea*.
 3523. *Andropogon pertusus panormitanus*.
 3532. *Paspalum fimbriatum*.
 3533. *Andropogon pertusus panormitanus*.
 3534. *Chloris paraguayensis*.
 3609. *Lasiacis divaricata*.
 3624. *Lasiacis sorghoidea*.
 3625. *Oplismenus setarius*.
 3647. *Lasiacis sorghoidea*.
 3655. *Pharus glaber*.
 3656. *Pharus glaber*.
 3659. *Lasiacis divaricata*.
 3660. *Lasiacis divaricata*.
 3661. *Coix lachryma-jobi*.
 3739. *Lasiacis divaricata*.

3748. *Ichnanthus pallens*.
 3798. *Phragmites phragmites*.
 3825. *Uniola virgata*.
 3826. *Heteropogon contortus*.
 3891. *Panicum utowanaeum*.
 3948. *Cenchrus viridis*.
 3949. *Panicum maximum*.
 3950. *Echinochloa colonum*.
 3986. *Olyra latifolia*.
 4027. *Aristida gyrans*.
 4049. *Holcus halepensis*.
 4079. *Paspalum poiiretii*.
 4142. *Lasiacis divaricata*.
 4159. *Lasiacis divaricata*.
 4169. *Paspalum paniculatum*.
 4170. *Syntherisma sanguinalis*.
 4171. *Panicum reptans*.
 4172. *Panicum maximum*.
 4174. *Panicum fasciculatum*.
 4203. *Olyra latifolia*.
 4219. *Syntherisma sanguinalis*.
 4228. *Eragrostis hypnoides*.
 4293. *Dactyloctenium aegyptium*.
 4299. *Sporobolus virginicus*.
 4328. *Eragrostis hypnoides*.
 4333. *Ichnanthus pallens*.
 4343. *Olyra latifolia*.
 4410. *Panicum diffusum*.
 4419. *Syntherisma digitata*.
 4421. *Echinochloa colonum*.
 4422. *Eleusine indica*.
 4438. *Echinochloa colonum*.
 4439. *Leptochloa virgata*.
 4440. *Panicum fasciculatum*.
 4441. *Lasiacis divaricata*.

ROWLEE, W. W.

49. *Stenotaphrum secundatum*.

RUGEL, F.

188. *Lasiacis rugelii*.
 189. *Oplismenus setarius*.
 194. *Leptochloa filiformis*.
 753. *Paspalum alterniflorum*.
 870. *Uniola virgata*.
 873. *Olyra latifolia*.
 880. *Chaetochloa onurus*.
 884. *Echinochloa colonum*.
 886. *Leptochloa filiformis*.
 887. *Eriochloa punctata*.
 889. *Echinochloa sabulicola*.

892. *Syntherisma sanguinalis*.
896. *Leptochloa virgata*.

SAGRA, R. DE LA.

96. *Arthrostylidium capillifolium*.

SCHOTT, A.

103. *Andropogon glomeratus*.

SEIN, BROTHER.

317. *Holcus halepensis*.
318. *Sorghastrum parviflorum*.
321. *Paspalum secans*.
356. *Cymbopogon citratus*.

SERGIUS, BROTHER.

2411. *Paspalum unispicatum*.
2566. *Panicum exiguiflorum*.
2569. *Chloris sagraeana*.
2570. *Arundinella berteroniana*.
2682. *Paspalum unispicatum*.
2712. *Chaetochloa onurus*.
2776. *Panicum adpersum*.
2777. *Paspalum plicatulum*.
2780. *Panicum laxum*.
2781. *Panicum laxum*.
2789. *Panicum geminatum*.
2790. *Syntherisma leucocoma*.

SHAFFER, J. A.

13. *Olyra latifolia*.
18. *Aristida adscensionis*.
19. *Eragrostis ciliaris*.
28. *Valota insularis*.
38. *Paspalum conjugatum*.
41. *Dactyloctenium aegyptium*.
48. *Aristida adscensionis*.
53. *Lithachne pauciflora*.
54. *Pharus glaber*.
68. *Eragrostis cubensis*.
84. *Eragrostis amabilis*.
142. *Antheophora hermaphrodita*.
153. *Eragrostis tephrosanthos*.
174. *Panicum laxum*.
185. *Dactyloctenium aegyptium*.
196. *Andropogon bicornis*.
215. *Bouteloua americana*.
217. *Panicum laxum* (Cuba).

217. *Cenchrus echinatus* (Montser-
rat).

224. *Andropogon glomeratus*.

244. *Bouteloua americana*.

253. *Lasiacis sorghoidea*.

255. *Lasiacis sorghoidea*.

320. *Cenchrus echinatus*.

324. *Pharus glaber*.

337. *Panicum trichoides*.

385. *Panicum diffusum*.

415. *Coix lachryma-jobi*.

482. *Opizia stolonifera*.

483. *Chloris virgata*.

528. *Olyra latifolia*.

534. *Leptochloa filiformis*.

536. *Eriochloa punctata*.

560. *Arthrostylidium capillifolium*.

584. *Panicum fasciculatum*.

691. *Sporobolus domingensis*.

700. *Cenchrus carolinianus* (Cuba).

700. *Lasiacis divaricata* (Montser-
rat).

701. *Lasiacis sorghoidea* (Montser-
rat).

701. *Uniola paniculata* (Cuba).

702. *Sporobolus berterianus*.

703. *Syntherisma sanguinalis*.

704. *Echinochloa colonum*.

705. *Eleusine indica*.

706. *Panicum trichoides*.

707. *Paspalum fimbriatum*.

710. *Ichnanthus pallens*.

716. *Chloris petraea*.

831. *Arthrostylidium capillifolium*.

- 961a. *Eragrostis hypnoides*.

972. *Sporobolus domingensis*.

993. *Leptochloa virgata*.

1022. *Cenchrus viridis*.

1073. *Lasiacis divaricata*.

1089. *Homalocenchrus monandrus*.

1091. *Leptochloa virgata*.

1142. *Lasiacis divaricata*.

1145. *Imperata brasiliensis*.

1147. *Lasiacis ligulata*.

1159. *Leptochloa filiformis*.

1183. *Aristida curtifolia*.

1195. *Sporobolus berterianus*.

1244. *Arthrostylidium capillifolium*.

1270. *Chloris paraguayensis*.

1348. *Olyra latifolia*.

1368. *Valota insularis*.

1375. *Lasiacis divaricata*.

- 1398a. *Arthrostylidium capillifolium*.

1437. *Sporobolus berterianus* (Montserratt).
 1437. *Panicum diffusum* (Cuba).
 1438. *Panicum condensum*.
 1446. *Ichnanthus pallens*.
 1512. *Panicum diffusum*.
 1535. *Leptochloa virgata*.
 1537. *Valota insularis*.
 1561. *Echinochloa colonum*.
 1614. *Sporobolus indicus*.
 1630. *Olyra latifolia*.
 1639. *Andropogon leucostachyus*.
 1657. *Sporobolus indicus*.
 1666. *Eragrostis hypnoides*.
 1668. *Capriola dactylon*.
 1681. *Andropogon leucostachyus*.
 1683. *Leptocoryphium lanatum*.
 1980. *Hymenachne amplexicaulis*.
 1981. *Leptochloa scabra*.
 1992. *Uniola virgata*.
 2404. *Eragrostis ciliaris*.
 2423. *Eragrostis tephrosanthos*.
 2435. *Valota insularis*.
 2461. *Panicum reptans*.
 2469. *Syntherisma digitata*.
 2470. *Cenchrus echinatus*.
 2472. *Chloris paraguayensis*.
 2474. *Chloris radiata*.
 2476. *Paspalum fimbriatum*.
 2481. *Sporobolus indicus*.
 2483. *Echinochloa colonum*.
 2496. *Dactyloctenium aegyptium*.
 2501. *Bouteloua americana*.
 2512. *Panicum distantiflorum*.
 2523. *Panicum laxum*.
 2549. *Lasiacis sloanei*.
 2559. *Pharus glaber*.
 2565. *Chaetochloa setosa*.
 2569. *Paspalum glabrum*.
 2570. *Lasiacis sloanei*.
 2571. *Lasiacis divaricata*.
 2574. *Cymbopogon citratus*.
 2575. *Eragrostis tephrosanthos*.
 2578. *Paspalum caespitosum*.
 2585. *Stenotaphrum secundatum*.
 2625. *Arthrostylidium capillifolium*.
 2626. *Sporobolus virginicus* (Cuba).
 2626. *Oplismenus hirtellus* (Porto Rico).
 2653. *Cenchrus viridis*.
 2668. *Arundo donax*.
 2686. *Eleusine indica*.
 2720. *Lasiacis divaricata*.
 2735. *Panicum amarulum*.
 2737. *Cenchrus carolinianus*.
 2738. *Sporobolus littoralis*.
 2739. *Chloris petraea*.
 2751. *Eragrostis ciliaris*.
 2768. *Uniola virgata*.
 2773. *Monanthochloë littoralis*.
 2795. *Muhlenbergia capillaris*.
 2830. *Panicum utowanæum*.
 2846. *Sporobolus littoralis*.
 2858. *Panicum maximum*.
 2874. *Paspalum distachyon*.
 2881. *Panicum barbinode*.
 2904. *Leptochloa nealleyi*.
 2905. *Paspalum distachyon*.
 2936. *Andropogon semiberbis*.
 2938. *Uniola virgata*.
 2952. *Eragrostis ciliaris*.
 2966. *Ichnanthus mayarensis*.
 2968. *Panicum aciculare*.
 2988. *Andropogon gracilis*.
 2990. *Aristida refracta*.
 2997. *Panicum scoparium*.
 2998. *Syntherisma sanguinalis*.
 2999. *Panicum nitidum*.
 3001. *Panicum nitidum*.
 3007. *Andropogon glomeratus*.
 3009. *Chaetochloa geniculata*.
 3010. *Coix lachryma-jobi*.
 3011. *Oplismenus hirtellus*.
 3013. *Isachne leersioides*.
 3017. *Lasiacis divaricata*.
 3018. *Panicum scoparium*.
 3020. *Chaetochloa onurus*.
 3022. *Ichnanthus pallens*.
 3058. *Ichnanthus mayarensis*.
 3080. *Aristida refracta*.
 3083. *Panicum polycaulon*.
 3172. *Cenchrus viridis*.
 3212. *Pharus glaber*.
 3488. *Olyra latifolia*.
 3668. *Triscenia ovina*.
 3694. *Aristida curtifolia*.
 3697. *Gynerium sagittatum*.
 3771. *Arthrostylidium fimbriatum*.
 3781. *Arundinella confinis*.
 3855. *Andropogon gracilis*.
 3856. *Imperata brasiliensis*.
 3858. *Aristida refracta*.
 3905. *Eragrostis amabilis*.
 3951. *Paspalum poliretii*.
 3955. *Panicum reptans*.
 7729. *Paspalum rupestre*.

7732. *Paspalum filiforme*.
 7761. *Axonopus compressus*.
 7772. *Pharus glaber*.
 7827. *Lasiacis divaricata*.
 7840. *Olyra latifolia*.
 8047. *Arthrostyldium sarmentosum*.
 8104. *Ischaemum rugosum*.
 8137. *Arthrostyldium fimbriatum*.
 8397. *Andropogon gracilis*.
 8537. *Olyra latifolia*.
 8561. *Isachne leersioides*.
 8751. *Lasiacis divaricata*.
 9014. *Panicum glutinosum*.
 9015. *Ichnanthus pallens*.
 9025. *Paspalum conjugatum*.
 10353. *Sorghastrum stipoides*.
 10364. *Aristida curtifolia*.
 10373. *Sporobolus indicus*.
 10374. *Cenchrus echinatus*.
 10384. *Andropogon fastigiatus*.
 10385. *Andropogon glomeratus*.
 10392. *Echinochloa colonum*.
 10393. *Chloris ciliata*.
 10397. *Panicum reptans*.
 10413. *Andropogon fastigiatus*.
 10414. *Aristida refracta*.
 10444. *Oplismenus hirtellus*.
 10445. *Cenchrus echinatus*.
 10455. *Olyra latifolia*.
 10456. *Eragrostis ciliaris laxa*.
 10457. *Syntherisma digitata*.
 10459. *Valota insularis*.
 10475. *Eleusine indica*.
 10481. *Andropogon brevifolius*.
 10484. *Panicum fusiforme*.
 10549. *Homalocenchrus monandrus*.
 10553. *Lithachne pauciflora*.
 10630. *Aristida curtifolia*.
 10639. *Panicum chrysopsidifolium*.
 10656. *Hymenachne amplexicaulis*.
 10659. *Panicum parvifolium*.
 10717. *Cenchrus distichophyllus*.
 10718. *Aristida refracta*.
 10730. *Chaetochloa geniculata*.
 10731. *Eragrostis cubensis*.
 10733. *Panicum aciculare*.
 10750. *Panicum tenerum*.
 10757. *Sporobolus purpurascens*.
 10769. *Syntherisma serotina*.
 10792. *Rytidix granularis*.
 10803. *Panicum parvifolium*.
 10807. *Panicum tenerum*.
 10862. *Paspalum multicaule*.
 10864. *Aristida refracta*.
 10873. *Panicum aciculare*.
 10910. *Panicum cayennense*.
 10912. *Panicum aquaticum*.
 10927. *Panicum virgatum cubense*.
 10934. *Erianthus saccharoides*.
 10975. *Andropogon bicornis*.
 11021. *Panicum erectifolium*.
 11043. *Muhlenbergia capillaris*.
 11049. *Panicum fusiforme*.
 11147. *Lasiacis sloanei*.
 11149. *Lasiacis divaricata*.
 11152. *Cenchrus viridis*.
 11218. *Andropogon fastigiatus*.
 11254. *Aristida refracta*.
 11793. *Panicum laxum*.
 11794. *Syntherisma sanguinalis*.
 11795. *Chaetochloa geniculata*.
 11796. *Eleusine indica*.
 11804. *Paspalum conjugatum*.
 11806. *Syntherisma sanguinalis*.
 11853. *Valota insularis*.
 12006. *Lasiacis grisebachii*.
 12060. *Bouteloua heterostega*.
 12073. *Andropogon saccharoides*.
 12074. *Cenchrus echinatus*.
 12099. *Chloris paraguayensis*.
 12116. *Bambos vulgaris*.
 12119. *Sporobolus indicus*.
 12121. *Dactyloctenium aegyptium*.
 12152. *Echinochloa colonum*.
 12187. *Eragrostis ciliaris*.
 12225. *Chloris sagraeana*.
 12323. *Lasiacis sorghoidea*.
 12344. *Sporobolus domingensis*.
 12386. *Bouteloua heterostega*.
 12392. *Syntherisma sanguinalis*.
 12394. *Chloris virgata*.
 13368. *Sporobolus indicus*.
 13499. *Olyra latifolia*.
 13504. *Pharus glaber*.
 13505. *Panicum pilosum*.
 13529. *Andropogon gracilis*.
 13531. *Valota insularis*.
 SHAFER, J. A., AND FITCH, W. R.
 1467. *Arthrostyldium capillifolium*.
 SHAFER, J. A., AND LEÓN, BROTHER.
 13533. *Lithachne pauciflora*.
 13535. *Panicum pilosum*.
 13539. *Paspalum paniculatum*.

- 13544. *Pharus latifolius*.
- 13562. *Panicum millegrana*.
- 13564. *Lasiacis divaricata*.
- 13609. *Leptocoryphium lanatum*.
- 13613. *Andropogon leucostachyus*.
- 13615. *Panicum acuminatum*.
- 13635. *Panicum zizanioides*.
- 13637. *Brachiaria platyphylla*.
- 13670. *Homalocenchrus monandrus*.
- 13677. *Paspalum minus*.
- 13681. *Chaetochloa geniculata*.
- 13715. *Andropogon gracilis*.
- 13717. *Andropogon leucostachyus*.
- 13719. *Panicum cayennense*.
- 13720. *Andropogon gracilis*.
- 13722. *Sporobolus brasiliensis*.
- 13724. *Brachiaria platyphylla*.
- 13725. *Syntherisma digitata*.
- 13850. *Brachiaria platyphylla*.
- 13852. *Echinochloa colonum*.

STIEBER, F. W.

- 11. *Paspalum virgatum*.
- 31. *Phragmites phragmites*.
- 129. *Antheophora hermaphrodita*.
- 137. *Paspalum saccharoides*.
- 143. *Paspalum paniculatum*.
- 364. *Paspalum notatum*.
- 366. *Paspalum conjugatum*.

SINTENIS, P.

- 16. *Sporobolus indicus*.
- 26. *Valota insularis*.
- 28. *Chloris radiata*.
- 29b. *Cenchrus carolinianus*.
- 30. *Ryttilix granularis*.
- 51. *Panicum maximum*.
- 68. *Lasiacis divaricata*.
- 72. *Oplismenus hirtellus*.
- 72b. *Oplismenus setarius*.
- 77. *Aristida portoricensis*.
- 98. *Axonopus compressus*.
- 99. *Paspalum conjugatum*.
- 125. *Andropogon bicornis*.
- 138. *Olyra latifolia*.
- 160. *Panicum trichoides*.
- 168. *Sporobolus indicus*.
- 208. *Chaetochloa geniculata*.
- 209. *Arthrostylidium multispicatum*.
- 211. *Andropogon brevifolius*.
- 212. *Oryza sativa*.

- 213. *Valota insularis*.
- 214. *Ichnanthus pallens*.
- 215. *Lasiacis ligulata*.
- 222. *Cymbopogon citratus*.
- 352. *Eleusine indica*.
- 353. *Andropogon fastigiatus*.
- 354. *Arthrostylidium sarmentosum*.
- 355. *Panicum acuminatum*.
- 356. *Coix lachryma-jobi*.
- 357. *Panicum glutinosum*.
- 358. *Paspalum plicatulum*.
- 360. *Panicum laxum*.
- 361. *Arundinella confinis*.
- 549. *Sporobolus argutus*.
- 549b. *Sporobolus domingensis*.
- 553. *Aristida adscensionis*.
- 555. *Chloris petraea*.
- 674. *Eragrostis hypnoides*.
- 743. *Eragrostis tephrosanthos*.
- 834. *Eleusine indica*.
- 835. *Sporobolus virginicus*.
- 838. *Eragrostis ciliaris*.
- 839. *Uniola virgata*.
- 840. *Uniola virgata*.
- 843. *Dactyloctenium aegyptium*.
- 844. *Leptochloa scabra*.
- 845. *Echinochloa colonum*.
- 847. *Panicum reptans*.
- 848. *Sporobolus virginicus*.
- 853. *Chaetochloa setosa*.
- 938. *Panicum elephantipes*.
- 1031. *Chloris petraea*.
- 1195. *Sporobolus berterianus*.
- 1212. *Capriola dactylon*.
- 1216. *Panicum parvifolium*.
- 1223 (in part). *Paspalum millegrana*.
- 1223 (in part). *Paspalum virgatum*.
- 1224. *Panicum acuminatum*.
- 1225. *Eragrostis hypnoides*.
- 1227b. *Eriochloa punctata*.
- 1228. *Eriochloa subglabra*.
- 1229. *Paspalum orbiculatum*.
- 1233. *Eragrostis elliottii*.
- 1254. *Panicum laxum*.
- 1255. *Syntherisma digitata*.
- 1292. *Eleusine indica*.
- 1355. *Isachne angustifolia*.
- 1571. *Gynerium sagittatum*.
- 1720. *Paspalum distichum*.
- 1889. *Echinochloa sabulicola*.
- 1901. *Panicum fasciculatum*.
- 1902. *Ryttilix granularis*.
- 1905. *Pharus glaber*.

1957. *Panicum adspersum*.
 1959. *Bouteloua heterostega*.
 2144. *Gynerium sagittatum*.
 2190. *Hymenachne amplexicaulis*.
 2203. *Bouteloua heterostega*.
 2225. *Oplismenus setarius*.
 2245. *Pharus glaber*.
 2267. *Bouteloua heterostega*.
 2272. *Sporobolus indicus*.
 2286. *Oplismenus setarius*.
 2318. *Lasiacis divaricata*.
 2320. *Eragrostis tephrosanthos*.
 2386. *Eriochloa punctata*.
 2396. *Lithachne pauciflora*.
 2406. *Ichnanthus nemorosus*.
 2451. *Paspalum portoricense*.
 2467. *Stenotaphrum secundatum*.
 2468. *Panicum maximum*.
 2470. *Lasiacis divaricata*.
 2471. *Panicum trichanthum*.
 2473. *Syntherisma digitata*.
 2507. *Pharus glaber*.
 2509. *Paspalum paniculatum*.
 2527. *Anatherum zizanioides*.
 2539. *Paspalum secans*.
 2543. *Echinochloa sabulicola*.
 2609. *Panicum glutinosum*.
 2612. *Paspalum plicatulum*.
 2715. *Paspalum distichum*.
 2720. *Imperata contracta*.
 2861. *Lasiacis sorghoidea*.
 2869. *Ichnanthus axillaris*.
 2870. *Oplismenus hirtellus*.
 2904. *Cenchrus viridis*.
 2987. *Chaetochloa setosa*.
 3042. *Pharus glaber*.
 3062. *Lasiacis sorghoidea*.
 3111. *Syntherisma sanguinalis*.
 3197. *Chaetochloa setosa*.
 3228. *Homalocenchrus monandrus*.
 3247. *Andropogon fastigiatus*.
 3282. *Leptochloa scabra*.
 3307. *Sporobolus argutus*.
 3348. *Holcus sorghum*.
 3365. *Panicum utowanaeum*.
 3366. *Panicum maximum*.
 3367. *Panicum geminatum*.
 3368. *Panicum reptans*.
 3416. *Panicum utowanaeum*.
 3416b. *Sporobolus argutus*.
 3438. *Aristida adscensionis*.
 3463. *Panicum utowanaeum*.
 3550. *Leptochloa filiformis*.
 3647. *Panicum fasciculatum*.
 3649. *Eragrostis ciliaris*.
 3766. *Aristida adscensionis*.
 3891. *Arthrostylidium capillifolium*.
 4045. *Isachne angustifolia*.
 4046. *Arthrostylidium sarmentosum*.
 4106. *Arthrostylidium multispicatum*.
 4253. *Eriochloa punctata*.
 4457. *Chaetochloa geniculata*.
 4481. *Andropogon leucostachyus*.
 4610. *Ichnanthus axillaris*.
 4764. *Olyra latifolia*.
 4766. *Paspalum fimbriatum*.
 4891. *Arundo donax*.
 4949. *Sporobolus indicus*.
 4983. *Panicum ghiesbreghtii*.
 5084. *Sporobolus littoralis*.
 5103. *Leptochloa scabra*.
 5245. *Anatherum zizanioides*.
 5294. *Cymbopogon citratus*.
 5295. *Cymbopogon citratus*.
 5516. *Andropogon fastigiatus*.
 5695. *Eragrostis tephrosanthos*.
 5719. *Panicum parvifolium*.
 5724. *Panicum polycaulon*.
 5797. *Arundinella confinis*.
 5902. *Andropogon virgatus*.
 5908. *Panicum acuminatum*.
 5918. *Lasiacis divaricata*.
 5985. *Panicum chrysopsidifolium*.
 5988. *Andropogon semiberbis*.
 6232. *Pharus glaber*.
 6335. *Chaetochloa magna*.
 6421. *Isachne angustifolia*.
 6498. *Chaetochloa tenacissima*.
 6617. *Andropogon bicornis*.
 6735. *Antheophora hermaphrodita*.
 6857. *Paspalum vaginatum*.
 6861. *Chaetochloa geniculata*.
 SMALL, J. K., AND CARTER, J. J.
 8586. *Lasiacis divaricata*.
 8658. *Paspalum caespitosum*.
 8711. *Cenchrus viridis*.
 8788. *Sporobolus virginicus*.
 8794. *Muhlenbergia capillaris*.
 8823. *Paspalum caespitosum*.
 8910. *Imperata brasiliensis*.
 8917. *Arthrostylidium capillifolium*.
 8918. *Chloris petraea*.
 8926. *Paspalum fimbriatum*.
 8947. *Stenotaphrum secundatum*.
 8972. *Cenchrus carolinianus*.

SMITH, G. W.

192. *Paspalum saccharoides*.
 840. *Sporobolus indicus*.
 843. *Paspalum saccharoides*.

STAHL, A.

2. *Bouteloua heterostega*.
 8. *Imperata contracta*.
 13. *Andropogon bicornis*.
 26. *Andropogon brevifolius*.
 28. *Anatherum zizanioides*.
 29. *Anatherum zizanioides*.
 42. *Paspalum densum*.

STEVENS, F. L.

4755. *Chusquea abietifolia*.

STEVENS, F. L., AND HESS, W. E.

4882. *Lasiacis harrisii*.

STEVENSON, J. A.

2217. *Syntherisma sanguinalis*.
 2218. *Syntherisma digitata*.
 2273. *Cymbopogon citratus*.
 2292. *Paspalum glabrum*.
 2304. *Eriochloa subglabra*.
 2416. *Cenchrus myosuroides*.
 2454. *Paspalum clavuliferum*.
 2518. *Arundinella confinis*.
 2580. *Uniola virgata*.
 2783. *Panicum portoricense*.
 2941. *Anatherum zizanioides*.
 2942. *Sporobolus virginicus*.
 2987. *Leptochloa scabra*.
 3024. *Chaetochloa vulpiseta*.
 3052. *Panicum miliaceum*.
 3219. *Paspalum conjugatum*.
 3220. *Panicum barbinode*.
 3282. *Axonopus aureus*.
 3327. *Ichnanthus pallens*.
 3339. *Andropogon brevifolius*.
 3341. *Panicum trichoides*.
 3498. *Cenchrus echinatus*.
 3566. *Panicum aquaticum*.
 3579. *Eragrostis ciliaris*.
 3758. *Panicum reptans*.
 3921. *Leptochloa filiformis*.

3987. *Eragrostis hypnoides*.
 3991. *Cenchrus echinatus*.
 3994. *Paspalum secans*.
 5190. *Paspalum secans*.
 5198. *Cenchrus echinatus*.
 5388. *Echinochloa sabulicola*.
 5389. *Paspalum distichum*.

TAYLOR, A. A.

16. *Andropogon selloanus*.
 17. *Andropogon nashianus*.
 20. *Aristida gyrans*.
 23. *Andropogon virgatus*.
 24. *Cenchrus echinatus*.
 25. *Eragrostis elliotii*.
 26. *Olyra latifolia*.
 31. *Mesosetum loliiforme*.
 32. *Panicum albomarginatum*.
 34. *Panicum cayennense*.
 35. *Panicum exiguum*.
 36. *Panicum pilosum*.
 37. *Panicum laxum*.
 38. *Paspalum plicatulum*.
 40. *Paspalum nanum*.
 41. *Paspalum rottboellioides*.
 42. *Paspalum virgatum*.
 44. *Reynaudia filiformis*.
 45. *Chaetochloa geniculata*.
 46. *Rhaphis pauciflora*.
 48. *Sporobolus indicus*.

TRACY, S. M.

9046. *Andropogon leucostachyus*.
 9047. *Lasiacis divaricata*.
 9048. *Leptocoryphium lanatum*.
 9049. *Syntherisma digitata*.
 9050. *Valota insularis*.
 9051. *Paspalum plicatulum*.
 9052. *Paspalum plicatulum*.
 9054. *Panicum laxum*.
 9055. *Panicum dichotomiflorum*.
 9056. *Paspalum distichum*.
 9057. *Eragrostis tephrosanthos*.
 9058. *Mesosetum loliiforme*.
 9059. *Manisuris loricata*.
 9060. *Panicum parvifolium*.
 9061. *Leptochloa virgata*.
 9062. *Panicum laxum*.
 9063. *Panicum pilosum*.
 9064. *Sporobolus indicus*.
 9066. *Sporobolus indicus*.
 9067. *Andropogon gracilis*.

9068 (in part). *Panicum ghiesbreghtii*.
 9068 (in part). *Andropogon tener*.
 9069. *Andropogon nashianus*.
 9070. *Reynaudia filiformis*.
 9071. *Leptocoryphium lanatum*.
 9072. *Panicum laxum*.
 9073. *Panicum cayennense*.
 9074. *Panicum fusiforme*.
 9075. *Panicum exiguiflorum*.
 9076. *Aristida erecta*.
 9077. *Syntherisma leucocoma*.
 9078. *Panicum acuminatum*.
 9079. *Panicum parvifolium*.
 9080. *Panicum tenerum*.
 9081. *Sporobolus indicus*.
 9082. *Panicum diffusum*.
 9083. *Valota insularis*.
 9084. *Chloris paraguayensis*.
 9085. *Chloris ciliata*.
 9086. *Trachypogon gouini*.
 9087. *Paspalum caespitosum*.
 9088. *Bouteloua heterostega*.
 9089. *Panicum utowanaeum*.
 9090. *Chaetochloa onurus*.
 9091. *Panicum fasciculatum*.
 9092. *Axonopus compressus*.
 9093. *Paspalum minus*.
 9094. *Lasiacis divaricata*.
 9095. *Aristida gyrans*.
 9096. *Eragrostis elliottii*.
 9097. *Eragrostis cubensis*.
 9098. *Panicum millegrana*.
 9099. *Panicum laxum*.
 9100. *Rytilix granularis*.
 9101. *Rytilix granularis*.
 9102. *Panicum adpersum*.
 9103. *Panicum reptans*.
 9104. *Syntherisma argillacea*.
 9105. *Paspalum alterniflorum*.
 9106. *Chloris ciliata*.
 9108. *Leptochloa virgata*.
 9109. *Panicum adpersum*.
 9110. *Chloris radiata*.
 9111. *Panicum diffusum*.
 9112. *Chaetochloa geniculata*.
 9113. *Chloris paraguayensis*.
 9114. *Panicum laxum*.
 9115. *Chloris ciliata*.
 9116. *Panicum ghiesbreghtii*.
 9117. *Paspalum plicatulum*.
 9118. *Paspalum notatum*.
 9119. *Paspalum denticulatum*.
 9120. *Paspalum virgatum*.

9121. *Paspalum millegrana*.
 9122. *Paspalum virgatum*.
 9123. *Paspalum virgatum*.
 9124. *Paspalum virgatum*.
 9125. *Paspalum secans*.
 9126. *Paspalum secans*.
 9127. *Paspalum virgatum*.
 9132. *Leptocoryphium lanatum*.
 9342. *Panicum dichotomiflorum*.

TRINIDAD BOTANICAL GARDEN HERBARIUM.

1328. *Oplismenus hirtellus*.
 1380. *Chaetochloa geniculata*.
 1674. *Oryza latifolia*.
 1675. *Arthrostyldium presteoi*.
 1678. *Echinochloa sabulicola*.
 1679. *Chaetochloa geniculata*.
 2155. *Paspalum densum*.
 2161. *Eragrostis ciliaris*.
 2164. *Axonopus compressus*.
 2175. *Paspalum coryphaeum*.
 2176. *Eleusine indica*.
 2177. *Panicum laxum*.
 2180. *Axonopus compressus*.
 2254. *Stenotaphrum secundatum*.
 2258. *Oplismenus hirtellus*.
 2259. *Oplismenus hirtellus*.
 2271. *Paspalum decumbens*.
 2275. *Paspalum orbiculatum*.
 2278. *Ichnanthus nemoralis*.
 2281. *Ichnanthus pallens*.
 2883. *Panicum fasciculatum*.
 2285. *Echinochloa colonum*.
 2286. *Panicum zizanioides*.
 2293. *Panicum stoloniferum*.
 2295. *Panicum hirsutum*.
 2298. *Lasiacis sorghoidea*.
 2299. *Ichnanthus ichnodes*.
 2303. *Lasiacis ruscifolia*.
 2304. *Manisuris aurita*.
 3035. *Eragrostis hypnoides*.
 3182. *Ichnanthus ichnodes*.
 3187. *Panicum stoloniferum*.
 3188. *Panicum zizanioides*.
 3189. *Ichnanthus pallens*.
 3190. *Lasiacis sorghoidea*.
 3191. *Ichnanthus pallens*.
 3192. *Panicum fasciculatum*.
 3194. *Panicum hirtum*.
 9195. *Panicum milleflorum*.
 3206. *Anatherum zizanioides*.

3208. *Chaetochloa geniculata*.
 3221. *Manisuris exaltata*.
 3224. *Oplismenus hirtellus*.
 3227. *Arundinella confinis*.
 3249. *Sporobolus virginicus*.
 3259. *Eragrostis glomerata*.
 3293. *Panicum pilosum*.
 3302. *Anatherum zizanioides*.
 3303. *Tripsacum dactyloides*.
 3304. *Chaetochloa vulpiseta*.
 3310. *Pappophorum alopecuroideum*.
 3318. *Ichnanthus leiocarpus*.
 3354. *Sacciolepis myuros*.
 3355. *Hymenachne auriculata*.
 3359. *Leptochloa longa*.
 3361. *Gymnopogon spicatus*.
 3364. *Pharus parvifolius*.
 3366. *Eragrostis glomerata*.
 3367. *Streptogyne crinita*.
 3368. *Leptocoryphium lanatum*.
 3371. *Planotia virgata*.
 3373. *Thrasya paspaloides*.
 3374. *Valota laxa*.
 3375. *Arundinella confinis*.
 3376. *Bambos vulgaris*.
 3377. *Chloris petraea*.
 3379. *Imperata contracta*.
 3380. *Ischaemum latifolium*.
 3382. *Andropogon leucostachyus*.
 3383. *Andropogon condensatus*.
 3433. *Syntherisma longiflora*.
 3704. *Sporobolus indicus*.
 4194. *Paspalum repens*.
 4197. *Panicum megiston*.
 5064. *Andropogon pertusus panormi-*
tanus.
 5425. *Ichnanthus axillaris*.
 6671. *Raddia nana*.

TÜBCKHEIM, H. VON.

2883. *Oplismenus burmanni*.
 3059. *Panicum xalapense*.
 3227. *Agrostis perennans*.
 3228. *Cenchrus echinatus*.
 3275. *Bouteloua heterostega*.
 3319. *Sphenopholis obtusata*.
 3321. *Panicum lancearium*.
 3413. *Agrostis perennans*.
 3414. *Danthonia domingensis*.
 3459. *Syntherisma panicea*.
 3557. *Agrostis perennans*.
 3558. *Agrostis perennans*.

3600. *Bouteloua heterostega*.
 3610. *Oplismenus burmanni*.
 3616. *Bouteloua americana*.
 3669. *Pennisetum domingense*.

UNDERWOOD, L. M., AND EARLE, F. S.

941. *Arthrostylidium angustifolium*.

UNDERWOOD, L. M., AND GRIGGS, R. F.

131. *Valota insularis*.
 144. *Lasiacis divaricata*.
 146. *Andropogon bicornis*.
 147. *Paspalum plicatulum*.
 149. *Paspalum millegrana*.
 175. *Paspalum conjugatum*.
 252. *Lasiacis divaricata*.
 406. *Cenchrus echinatus*.
 462. *Panicum fasciculatum*.
 505. *Pharus glaber*.
 564. *Valota insularis*.
 576. *Paspalum fimbriatum*.
 718. *Gynerium sagittatum*.
 794. *Paspalum virgatum*.
 824. *Panicum fasciculatum*.
 845. *Pharus glaber*.
 883. *Chloris radiata*.
 895. *Eragrostis ciliaris*.
 910. *Sporobolus littoralis*.
 955. *Panicum portoricense*.
 959. *Stenotaphrum secundatum*.
 996. *Sporobolus virginicus*.

VAN HERMANN, H.

455. *Pharus glaber*.
 763. *Panicum pilosum*.
 1873. *Bouteloua heterostega*.
 2444. *Panicum diffusum*.

WETMORE, A.

166. *Sporobolus indicus*.
 167. *Paspalum secans*.
 171. *Ichnanthus pallens*.
 172. *Olyra latifolia*.
 176. *Paspalum millegrana*.
 192. *Panicum fasciculatum*.

WILSON, N.

304. *Olyra latifolia*.
 315. *Eragrostis tephrosanthos*.

318. *Ichnanthus pallens*.
 320. *Axonopus compressus*.
 322. *Panicum fasciculatum*.
 324. *Paspalum filiforme*.
 325. *Oplismenus hirtellus*.
 486. *Bromus sterilis*.
 490. *Leptochloa virgata*.

WILSON, P.

43. *Paspalum melanospermum*.
 159. *Paspalum conjugatum*.
 160. *Isachne angustifolia*.
 226. *Andropogon bicornis*.
 227. *Paspalum virgatum*.
 283. *Panicum trichoides*.
 350. *Lasiacis ligulata*.
 420. *Paspalum plicatulum*.
 421. *Paspalum plicatulum*.
 438 (In part). *Andropogon bicornis*.
 438 (In part). *Panicum maximum*.
 443. *Stenotaphrum secundatum*.
 593. *Panicum fasciculatum*.
 1006. *Paspalum conjugatum*.
 1043. *Cenchrus echinatus*.
 1139. *Eleusine indica*.
 1182. *Eragrostis tephrosanthos*.
 1277. *Paspalum conjugatum*.
 1279. *Sporobolus indicus*.
 1405. *Panicum diffusum*.
 1473. *Valota insularis*.
 2207. *Andropogon glomeratus*.
 3666. *Eragrostis tephrosanthos*.
 7608. *Eragrostis ciliaris*.
 7628. *Eragrostis ciliaris*.
 7665. *Eragrostis ciliaris*.
 7828. *Eragrostis ciliaris*.
 7936. *Cenchrus carolinianus*.
 7947. *Chloris petraea*.
 7975. *Chaetochloa geniculata*.
 8001. *Sporobolus domingensis*.
 8056. *Eragrostis ciliaris*.
 8061. *Chaetochloa geniculata*.
 8066. *Panicum adpersum*.
 8151. *Cenchrus carolinianus*.
 8267. *Andropogon glomeratus*.
 8285. *Andropogon virginicus*.
 9160. *Bouteloua disticha*.
 9163. *Andropogon caricosus*.
 9175. *Antheophora hermaphrodita*.
 9179. *Eragrostis ciliaris*.
 9187. *Panicum reptans*.
 9210. *Ichnanthus pallens*.

9215. *Achlaena piptostachya*.
 9238. *Lasiacis grisebachii*.
 9243. *Panicum reptans*.
 9245. *Eleusine indica*.
 9247. *Olyra latifolia*.
 9249. *Leptochloa virgata*.
 9257. *Eragrostis prolifera*.
 9278. *Hymenachne amplexicaulis*.
 9280. *Oplismenus hirtellus*.
 9320. *Echinochloa colonum*.
 9332. *Lasiacis grisebachii*.
 9394. *Valota insularis*.
 9399. *Panicum reptans*.
 9402. *Leptochloa virgata*.
 9404. *Paspalum conjugatum*.
 9411. *Chaetochloa onurus*.
 9443. *Panicum diffusum*.
 9444. *Panicum pilosum*.
 9488. *Aristida scabra*.
 9497. *Panicum utowanaeum*.
 9502. *Chloris paraguayensis*.
 9531. *Eragrostis ciliaris*.
 9558. *Panicum stevensianum*.
 9560. *Lithachne pauciflora*.
 9562. *Hymenachne amplexicaulis*.
 9567. *Panicum zizanioides*.
 11309. *Lasiacis grisebachii*.
 11363. *Lasiacis divaricata*.
 11391. *Panicum fasciculatum*.
 11421. *Lasiacis sloanei*.
 11449. *Lasiacis rugelii*.
 11459. *Valota insularis*.
 11491. *Panicum adpersum*.
 11514. *Syntherisma sanguinalis*.
 11515. *Pharus glaber*.
 11576. *Axonopus compressus*.
 11577. *Panicum maximum*.
 11582. *Olyra latifolia*.

WILSON, P., AND LEÓN, BROTHER.

2872. *Paspalum breve*.
 11467. *Lasiacis grisebachii*.
 11489. *Cenchrus echinatus*.
 11538. *Ichnanthus nemorosus*.
 11590. *Bouteloua disticha*.
 11594. *Gouinia virgata*.
 11599. *Paspalum breve*.
 11602. *Paspalum ciliiferum*.
 11620. *Lithachne pauciflora*.
 11632. *Reynaudia filiformis*.
 11637. *Chloris cruciata*.
 11642. *Eriochloa filifolia*.
 11645. *Aristida curtifolia*.

WRIGHT, C.

731. *Homalocenchrus monandrus*.
 732. *Lithachne pauciflora*.
 733. *Pharus glaber*.
 736 (in part). *Aristida curtifolia*.
 736 (in part). *Aristida refracta*.
 737. *Aristida curtifolia*.
 738. *Arthrostylidium capillifolium*.
 739. *Bouteloua heterostega*.
 740 (in part). *Leptochloa virgata*.
 740 (in part). *Leptochloa filiformis*.
 741 (in part). *Leptochloa virgata*.
 741 (in part). *Leptochloa filiformis*.
 742. *Chloris radiata*.
 743. *Chloris ciliata*.
 744. *Eleusine indica*.
 746. *Olyra latifolia*.
 747. *Lasiacis divaricata*.
 748. *Lasiacis grisebachii*.
 750. *Ichnanthus pallens*.
 751. *Oplismenus hirtellus*.
 752. *Echinochloa colonum*.
 753. *Panicum trichanthum*.
 754. *Panicum fasciculatum*.
 755 (in part). *Isachne leersioides*.
 755 (in part). *Panicum exiguiflorum*.
 756. *Triscenia ovina*.
 757. *Panicum glutinosum*.
 758. *Panicum ghiesbreghtii*.
 759. *Panicum laxum*.
 761. *Panicum geminatum*.
 762. *Panicum reptans*.
 763. *Panicum reptans*.
 764 (in part). *Syntherisma digitata*.
 764 (in part). *Syntherisma sanguinalis*.
 765. *Axonopus compressus*.
 766. *Paspalum paniculatum*.
 767. *Paspalum conjugatum*.
 768. *Paspalum plicatulum*.
 769 (in part). *Paspalum lindenianum*.
 769 (in part). *Paspalum caespitosum*.
 770. *Andropogon bicornis*.
 886. *Paspalum densum*.
 887. *Ichnanthus pallens*.
 891. *Panicum cayennense*.
 911. *Paspalum distichum*.
 936. *Paspalum minus*.
 947. *Paspalum vaginatum*.
 1536. *Lithachne pineti*.
 1537. *Sporobolus berterianus*.
 1538. *Panicum trichoides*.
 1539. *Scutachne dura*.
 1540. *Panicum diffusum*.
 1541. *Valota insularis*.
 1542. *Eriochloa punctata*.
 1543. *Oplismenus setarius*.
 1544 (in part). *Syntherisma curv-nervis*.
 1544 (in part). *Syntherisma panicea*.
 1545. *Panicum barbinode*.
 1546. *Paspalum distichum*.
 1547. *Pennisetum domingense*.
 1548 (in part). *Chloris cruciata*.
 1548 (in part). *Chloris sagraeana*.
 1549 (in part). *Chloris cruciata*.
 1549 (in part). *Chloris sagraeana*.
 1550. *Eragrostis ciliaris*.
 1551. *Tripogon spicatus*.
 1552. *Arundinella berteroniana*.
 1553. *Rytilix granularis*.
 1554. *Arthrostylidium fimbriatum*.
 1555 (in part). *Andropogon bicornis*.
 1555 (in part). *Andropogon glomeratus*.
 1556. *Andropogon saccharoides*.
 1557. *Andropogon gracilis*.
 1558 (in part). *Andropogon hirtiflorus*.
 1558 (in part). *Andropogon brevifolius*.
 1559. *Heteropogon contortus*.
 1560. *Gynerium sagittatum*.
 2823. *Uniola paniculata*.
 2829. *Sporobolus indicus*.
 3422. *Eragrostis glutinosa*.
 3423. *Eragrostis elliotii*.
 3424. *Eragrostis cubensis*.
 3425. *Eragrostis prolifera*.
 3426. *Sporobolus indicus*.
 3427 (in part). *Sporobolus purpureus*.
 3427 (in part). *Sporobolus cubensis*.
 3428. *Reynaudia filiformis*.
 3429. *Leptocoryphium lanatum*.
 3430. *Aristida refracta*.
 3431. *Aristida refracta*.
 3432. *Aristida erecta*.
 3433. *Aristida curtifolia*.
 3434. *Homalocenchrus hexandrus*.
 3435. *Mniochloa streptioides*.
 3436 (in part). *Leptochloa domingensis*.
 3436 (in part). *Leptochloa virgata*.

- 3427 (in part). *Reimarochloa brasiliensis*.
 3437 (in part). *Homalocenchrus hexandrus*.
 3438 (in part). *Paspalum minus*.
 3438 (in part). *Paspalum notatum*.
 3439. *Paspalum pulchellum*.
 3440. *Paspalum dissectum*.
 3441. *Brachiaria platyphylla*.
 3442. *Paspalum rigidifolium*.
 3443 (in part). *Paspalum caespitosum*.
 3443 (in part). *Paspalum simpsoni*.
 3444 (in part). *Paspalum caespitosum*.
 3444 (in part). *Paspalum clavuliferum*.
 3444 (in part). *Paspalum poiiretii*.
 3445 (in part). *Paspalum poiiretii*.
 3445 (in part). *Paspalum rupestre*.
 3446 (in part). *Paspalum milligrana*.
 3446 (in part). *Paspalum secans*.
 3446 (in part). *Paspalum virgatum*.
 3447. *Paspalum densum*.
 3448. *Mniochloa pulchella*.
 3449. *Mesosetum loliforme*.
 3450. *Panicum exiguiflorum*.
 3451 (in part). *Panicum pilosum*.
 3451 (in part). *Panicum laxum*.
 3452 (in part). *Panicum distantiflorum*.
 3452 (in part). *Panicum utowanaeum*.
 3453. *Panicum fusiforme*.
 3454 (in part). *Panicum aciculare*.
 3454 (in part). *Panicum fusiforme*.
 3454a. *Panicum neuranthum*.
 3455. *Panicum millegrana*.
 3456 (in part). *Panicum aquaticum*.
 3457. *Lasiacis grisebachii*.
 3458. *Panicum parvifolium*.
 3460 (in part). *Panicum lancearium*.
 3460 (in part). *Panicum leucothrix*.
 3461. *Panicum aciculare*.
 3462. *Panicum erectifolium*.
 3463 (in part). *Panicum wrightianum*.
 3463 (in part). *Panicum leucothrix*.
 3463 (in part). *Panicum coerulescens*.
 3464. *Scutachne amphistemon*.
 3465. *Lasiacis rugelii*.
 3466. *Panicum zizanioides*.
 3467. *Panicum scoparium*.
 3468. *Ichnanthus mayarensis*.
 3469. *Hymenachne amplexicaulis*.
 3470. *Sacciolepis vilvoides*.
 3471. *Pennisetum setosum*.
 3472. *Chaetochloa geniculata*.
 3473. *Chaetochloa geniculata*.
 3474. *Chaetochloa onurus*.
 3475. *Cenchrus distichophyllus*.
 3476. *Cenchrus carolinianus*.
 3477. *Gynierium sagittatum*.
 3478. *Arundinella confinis*.
 3479. *Arundinella deppeana*.
 3480. *Andropogon virgatus*.
 3481. *Andropogon virgatus*.
 3482. *Andropogon tener*.
 3483. *Andropogon fastigiatus*.
 3484. *Andropogon gracilis*.
 3485. *Andropogon fastigiatus*.
 3486. *Imperata brasiliensis*.
 3487. *Achlaena piptostachya*.
 3488. *Holcus halepensis*.
 3489. *Nazia aliena*.
 3490. *Stenotaphrum secundatum*.
 3808. *Arthrostylidium distichum*.
 3809. *Arthrostylidium cubense*.
 3810. *Arthrostylidium urbanii*.
 3811. *Arthrostylidium cubense*.
 3812. *Leptochloa fascicularis*.
 3813. *Luziola bahiensis*.
 3815. *Bouteloua heterostega*.
 3816. *Bouteloua americana*.
 3817. *Chloris petraea*.
 3818. *Chloris sagraeana*.
 3819. *Chloris sagraeana*.
 3821. *Dactyloctenium aegyptium*.
 3822. *Leptochloa fascicularis*.
 3823. *Uniola paniculata*.
 3825. *Eragrostis cubensis*.
 3826. *Eragrostis hypnoides*.
 3827. *Sporobolus brasiliensis*.
 3828. *Sporobolus argutus*.
 3830. *Sporobolus virginicus*.
 3831. *Aristida gyrans*.
 3832. *Aristida gyrans*.
 3833. *Aristida refracta*.
 3834. *Aristida refracta*.
 3835. *Aristida scabra*.
 3836. *Muhlenbergia capillaris*.
 3837. *Homalocenchrus hexandrus*.
 3838. *Oryza sativa*.
 3839. *Paspalum plicatulum*.
 3840. *Paspalum millegrana*.
 3841. *Paspalum alterniflorum*.
 3842. *Paspalum nanum*.

3843. *Paspalum wrightii*.
 3844. *Paspalum multicaule*.
 3845. *Paspalum propinquum*.
 3847. *Paspalum convexum*.
 3848. *Paspalum leptocaulon*.
 3849. *Axonopus compressus*.
 3850. *Axonopus compressus*.
 3851. *Paspalum decumbens*.
 3852. *Panicum diffusum*.
 3853. *Brachiaria platyphylla*.
 3854 (in part). *Paspalum vaginatum*.
 3854 (in part). *Reimarochloa oligostachya*.
 3855. *Panicum millegrana*.
 3857. *Panicum reptans*.
 3858. *Ichnanthus nemorosus*.
 3859. *Mesosetum wrightii*.
 3860 (in part). *Panicum bartowense*.
 3860 (in part). *Panicum diffusum*.
 3861. *Panicum aquaticum*.
 3862 (in part). *Panicum condensum*.
 3862 (in part). *Panicum laxum*.
 3863 (in part). *Panicum laxum*.
 3863 (in part). *Hymenachne auriculata*.
 3864. *Paspalum rottboellioides*.
 3865. *Panicum cayennense*.
 3866. *Paspalum nanum*.
 3867. *Brachiaria platyphylla*.
 3868. *Scutachne dura*.
 3869. *Panicum adpersum*.
 3870 (in part). *Panicum tenerum*.
 3870 (in part). *Panicum distantiflorum*.
 3871. *Panicum stenodes*.
 3872. *Panicum megiston*.
 3873. *Panicum virgatum cubense*.
 3874. *Panicum acuminatum*.
 3875 (in part). *Panicum polycaulon*.
 3875 (in part). *Panicum strigosum*.
 3876. *Panicum portoricense*.
 3877 (in part). *Panicum diffusum*.
 3877 (in part). *Panicum exiguiiflorum*.
 3878. *Lasiacis sloanei*.
 3879. *Echinochloa sabulicola*.
 3880. *Ichnanthus mayarensis*.
 3881. *Ichnanthus nemorosus*.
 3882. *Ichnanthus nemorosus*.
 3883. *Syntherisma sanguinalis*.
 3884. *Syntherisma villosa*.
 3885. *Sacciolepis striata*.
 3886. *Eriochloa ramosa*.
 3887. *Chaetochloa onurus*.
 3888. *Chaetochloa geniculata*.
 3889. *Cenchrus viridis*.
 3890. *Antheophora hermaphrodita*.
 3891. *Andropogon semiberbis*.
 3892. *Trachypogon filifolius*.
 3893. *Trachypogon filifolius*.
 3894. *Saugetia fasciculata*.
 3895. *Rhaphis pauciflora*.
 3896. *Sorghastrum stipoides*.
 3897. *Sorghastrum parviflorum*.
 3898. *Andropogon cubensis*.
 3899. *Andropogon nashianus*.
 3900. *Andropogon selloanus*.
 3901. *Andropogon virginicus*.
 3902. *Andropogon bicornis*.
 3903. *Erianthus saccharoides*.
 3904. *Manisuris impressa*.
 3905. *Manisuris loricata*.
 3906. *Paratheria prostrata*.
 WRIGHT, C., PARRY, C. C., AND BRUM-
 MEL, H.
 605. *Pharus latifolius*.
 606. *Pharus latifolius*.
 607. *Paspalum glabrum*.
 608. *Ichnanthus pallens*.
 609. *Axonopus compressus*.
 610. *Chloris sagraeana*.
 611. *Eragrostis ciliaris*.
 612. *Chloris paraguayensis*.
 613. *Oplismenus hirtellus*.
 614. *Lasiacis sloanei*.
 615. *Lasiacis divaricata*.
 616. *Cymbopogon hirtus*.
 617. *Paspalum glabrum*.
 618. *Paspalum glabrum*.
 619. *Phragmites phragmites*.
 620. *Paspalum virgatum*.
 621. *Cenchrus viridis*.
 622. *Syntherisma panicea*.
 623. *Reynaudia filiformis*.
 624. *Panicum stenodes*.
 625. *Andropogon virgatus*.
 626. *Arundinella confinis*.
 627. *Panicum diffusum*.
 629. *Andropogon bicornis*.
 630 (in part). *Valota insularis*.
 630 (in part). *Paspalum paniculatum*.
 631. *Andropogon saccharoides*.
 WULLSCHLAEGEL, H. R.
 64. *Panicum diffusum*.
 593. *Paspalum notatum*.
 595. *Axonopus compressus*.

- | | |
|--|--|
| <p>596. <i>Axonopus compressus</i>.
 603. <i>Paspalum secans</i>.
 606. <i>Paspalum fimbriatum</i>.
 607. <i>Eriochloa punctata</i>.
 608. <i>Syntherisma digitata</i>.
 609. <i>Syntherisma digitata</i>.
 610. <i>Chloris sagraeana</i>.
 611. <i>Syntherisma sanguinalis</i>.
 612. <i>Echinochloa colonum</i>.
 614. <i>Panicum geminatum</i>.
 615. <i>Panicum adpersum</i>.
 616. <i>Panicum adpersum</i>.
 617. <i>Panicum reptans</i>.
 618. <i>Chaetochloa barbata</i>.
 619 (in part). <i>Bouteloua americana</i>.
 619 (in part). <i>Ichnanthus pallens</i>.
 623. <i>Panicum laxum</i>.
 623b. <i>Panicum maximum</i>.</p> | <p>624. <i>Lasiacis sorghoidea</i>.
 625. <i>Lasiacis divaricata</i>.
 626. <i>Oplismenus setarius</i>.
 629. <i>Chaetochloa rariflora</i>.
 633. <i>Cenchrus echinatus</i>.
 634. <i>Cenchrus carolinianus</i>.
 635. <i>Echinochloa spectabilis</i>.
 644. <i>Eragrostis purpurascens</i>.
 657. <i>Leptochloa virgata</i>.
 671. <i>Olyra latifolia</i>.
 673. <i>Pharus glaber</i>.
 872. <i>Lasiacis sloanei</i>.
 1102. <i>Paspalum paniculatum</i>.
 1108. <i>Panicum zizanioides</i>.
 1116. <i>Chloris polydactyla</i>.
 1117. <i>Leptochloa domingensis</i>.
 1163. <i>Panicum glutinosum</i>.
 1370. <i>Reynaudia filiformis</i>.</p> |
|--|--|

INDEX.

[Synonyms in *italic*. Page numbers of principal entries in heavy-face type.]

	Page.		Page.
Aberemoa	60, 61, 64, 65	Agrostioidea	325
<i>guianensis</i>	61	<i>Aira brasiliensis</i>	368
<i>glabrescens</i>	61	<i>gigantea</i>	401
<i>longifolia</i>	65	<i>laxa</i>	393
<i>rhizantha</i>	66	<i>obtusata</i>	372
Acacias	57	<i>spicata</i>	371
Achlaena	290, 291	Alagadisso	39
<i>piptostachya</i>	291	<i>Alectoridia quartiniana</i>	277
Achradelpha	77	Alga	77
<i>mammosa</i>	81	Alligator apple	15, 43
Achras	76	Allionia	98
<i>mammosa</i>	85	<i>arenaria</i>	101
<i>sapota</i>	78	<i>campanulata</i>	101
<i>zapota</i>	76, 78, 83	Allioniaceae	87, 98
<i>zapotilla</i>	78	<i>Alloteropsis amphistemon</i>	341
Achyranthes	89	<i>dura</i>	341
<i>calea</i>	94	<i>Alopecurus monspeliensis</i>	371
<i>cordobensis</i>	90	<i>Alternanthera</i>	89
<i>laguroides</i>	90	<i>latifolia</i>	94
<i>mexicana</i>	89	Amaranthaceae	87, 88
<i>panamensis</i>	89	Amblyanthera (section)	143, 144
<i>piloselloides</i>	93	Amherstieae (tribe)	148
<i>pycnantha</i>	90	Amor seco	352
<i>stenophylla</i>	90	<i>Amphilophis ischaemum</i>	282
<i>williamsii</i>	89, 90, 91	<i>piptatherus</i>	282
Acutiflorae (group)	14	<i>saccharoides</i>	283
(section).....	14, 16	<i>Anastrophus compressus</i>	300
Adenocalymna alliaceum	257	Anatherum	285
<i>anomalum</i>	254	<i>berterianum</i>	401
<i>asperulum</i>	256	<i>bicorne</i>	283
<i>cocleense</i>	255	<i>caudatum</i>	273
<i>comosum</i>	255	<i>domingense</i>	283
<i>flos-ardeae</i>	256	<i>inermis</i>	280, 281
<i>hosmeca</i>	256	<i>macrourum</i>	284
<i>laevigatum</i>	256	<i>muricatum</i>	285
Agaves	57	<i>pedunculatum</i>	401
<i>Agrosticula muralis</i>	368	<i>portoricense</i>	273
Agrostideae	265, 269	<i>spathiflorum</i>	280, 281
Agrostis	371	<i>virgatum</i>	280
<i>alba</i>	371	<i>zizanioides</i>	285
<i>berteriana</i>	290	Andira chiricana	235
<i>brasiliensis</i>	302	<i>fraxinifolia</i>	235
<i>complanata</i>	374, 375	Andropogon	277
<i>cruciata</i>	375	<i>agrostioides</i>	287
<i>domingensis</i>	369	<i>annulatus</i>	282
<i>indica</i>	369	<i>var. subrepens</i>	281
<i>jamaicensis</i>	295	<i>arundinaceus</i>	286
<i>littoralis</i>	369, 371	<i>avenaceus</i>	286
<i>monostachya</i>	340	<i>barbatus</i>	377
<i>perennans</i>	371	<i>bicornis</i>	283
<i>purpurascens</i>	370	<i>brevifolius</i>	279
<i>pyramidalis</i>	368	<i>caricosus</i>	281
<i>pyramidata</i>	368	<i>condensatus</i>	280, 401
<i>radiata</i>	375	<i>contortus</i>	287
<i>rigidifolia</i>	342	<i>cubensis</i>	280
<i>tenuissima</i>	370	<i>densus</i>	284
<i>virginica</i>	369	<i>domingensis</i> Hubbard.....	281

	Page.		Page.
<i>Andropogon domingensis</i> Spreng.....	287	<i>Annona cercocarpa</i>	4
<i>domingensis</i> Steud.....	283	<i>cherimola</i>	19, 40, 41, 42, 45, 46, 47, 49, 50, 68
<i>fastigiatus</i>	279	<i>conica</i>	62, 63
<i>francavillanus</i>	287	<i>coriacea</i>	8, 29
<i>glomeratus</i>	284	<i>cornifolia</i>	2, 4, 5, 13, 37, 39
<i>gracilis</i>	280	<i>crassiflora</i>	9, 10
<i>haléensis</i>	286	<i>crassivenia</i>	20, 49, 50, 51
<i>hirtiflorus</i>	281	<i>crotonifolia</i>	12
<i>hirtus</i>	284	<i>distribution</i>	4
<i>imberbis</i> var. <i>muticus</i>	281	<i>diversifolia</i>	4, 19, 31, 47, 48
<i>inermis</i>	280	<i>dwarf wild</i>	19
<i>insularis</i>	292	<i>echinata</i>	37
<i>ischaemum</i>	282	<i>fagifolia</i>	13
<i>funcifolius</i>	280	<i>fruticosa</i>	54, 55
<i>latifolius</i>	274	<i>glabra</i>	3, 4, 5, 8, 14, 15, 24, 30, 42, 43
<i>leucopogon</i>	283	<i>glaucæ</i>	4, 5
<i>leucostachyus</i>	283	<i>globiflora</i>	21, 45, 52, 54, 55, 56
var. <i>selloanus</i>	283	<i>holosericea</i>	3, 12
<i>macrourus</i>	284	<i>hypoglaucæ</i>	12
<i>malacostachyus</i>	279	<i>involucrata</i>	9, 32
<i>microstachyus</i>	280	<i>jahnii</i>	36
<i>multinervosus</i>	280	<i>jamaicensis</i>	67, 67, 68, 68
<i>muricatus</i>	285	<i>jenmanii</i>	3, 11, 34
<i>nardus</i>	285	<i>klainii</i>	4, 5, 15
<i>nashianus</i>	284	<i>laurentii</i>	5
<i>nodosus</i>	281	<i>longiflora</i>	4, 19, 43, 45, 46, 68
<i>obtusifolius</i>	279	<i>longifolia</i>	5, 64
<i>oligostachyus</i>	281	<i>longipes</i>	12
<i>panormitanus</i>	282	<i>lutescens</i>	19, 41, 43
<i>pertusus</i>	282	<i>macrocarpa</i>	10
var. <i>panormitanus</i>	282	<i>macrophyllata</i>	20, 47, 48
<i>piptatherus</i>	282	<i>malmeana</i>	12
<i>polydactylon</i>	377	<i>manirote</i>	32, 33
<i>quadrivalvis</i>	288	<i>mannii</i>	5
<i>saccharoides</i>	282	<i>marcgravii</i>	8, 25, 27
subsp. <i>leucopogon</i> subvar. <i>paucira-</i>		<i>montana</i>	3, 7, 22, 25, 27
<i>meus</i>	282, 283	<i>muricata</i> 1, 3, 4, 7, 8, 14, 22, 23, 24, 25, 25, 26, 30, 31	
var. <i>surius</i>	283	<i>muricata</i>	25
<i>salzmanni</i>	281	<i>nutans</i>	2, 3, 4, 5, 13, 29
<i>scoparius</i>	280	<i>palmeri</i>	19, 43, 45
<i>secundus</i>	287	<i>paludosa</i>	9, 11, 12, 84
<i>selloanus</i>	283	<i>palustris</i>	5, 14, 23, 30
<i>semiberbis</i>	282	<i>pittieri</i>	13
var. <i>incertus</i>	281	<i>praetermissa</i>	19, 67, 68
<i>setosus</i>	287, 402	<i>purpurea</i>	3, 4, 9, 10, 11, 30, 31, 32, 33, 36, 37
<i>sorghum</i>	286	<i>pygmaea</i>	8
<i>sudanensis</i>	286	<i>quinduensis</i>	5
<i>spathiflorus</i>	280	<i>reticulata</i>	4, 19, 42, 43, 58, 68
<i>squarrosus</i>	285	<i>rhizantha</i>	5
<i>stipoides</i>	287	<i>rhombipetala</i>	64
<i>tener</i>	281	<i>rodriguesii</i>	10
<i>tenuispathus</i>	284	<i>rosel</i>	2, 22, 55, 56, 57
<i>urbanianus</i>	284	<i>salzmanni</i>	8, 29
<i>virgatus</i>	280	<i>sancta-crucis</i>	12
<i>virginicus</i>	284	<i>scandens</i>	12
<i>wrightii</i>	288	<i>scleroderma</i>	4, 18
<i>zizanioides</i>	285	<i>sclerophylla</i>	21, 52
<i>Andropogoneae</i>	264, 265	<i>senegalensis</i>	4, 5, 8, 14
<i>Angustifolia</i>	323	<i>sericea</i>	12, 67, 68, 68
<i>Annona</i>	7, 13, 21, 36, 46, 47, 58, 59, 60, 61, 65, 66	<i>sessiliflora</i>	6
<i>acuminata</i>	2	<i>sphaerocarpa</i>	8, 24, 25
<i>acutiflora</i>	15, 40, 52	<i>spinescens</i>	13, 39
<i>bicolor</i>	22, 55, 56	<i>nutans</i>	39
<i>bullata</i>	48, 50, 51	<i>squamosa</i>	2, 4, 42, 43, 45
<i>cascarilloides</i>	4, 21, 51, 52, 53	<i>stenophylla</i>	4, 8

	Page.		Page.
<i>Annona subdivisions</i>	1	<i>Arcytophyllum cephalanthum</i>	127, 128
<i>tenuiflora</i>	63	<i>hartwegianum</i>	128
<i>testudinea</i>	18	<i>latifolium</i>	127
<i>tomentosa</i>	12	<i>lavarum</i>	127
<i>tripetala</i>	68	<i>shannoni</i>	127
<i>walkeri</i>	13	<i>Aristida</i>	364
<i>Annonaceae</i>	28, 54, 55, 56, 57, 59	<i>adscensionis</i>	365
<i>Annonas</i>	20	<i>var. americana</i>	380
dwarf.....	21	<i>americana</i>	380
sharp-petaled.....	14	<i>antillarum</i>	380
sliky.....	9	<i>bromoides</i>	365
<i>Annonella of Santo Domingo</i>	2	<i>cognata</i>	365
<i>Annonella (section)</i>	21, 52, 55, 56	<i>curtifolia</i>	365
<i>Annonellae (group)</i>	21	<i>dispersa</i>	365
<i>Annonula (section)</i>	21, 51	<i>domingensis</i>	281
<i>Anon cimarron</i>	63	<i>erecta</i>	366
<i>Anona</i>	15, 48	<i>geminata</i>	377
<i>acutiflora</i>	40	<i>gyrans</i>	366
<i>axilliflora</i>	55, 55, 56	<i>humilis</i>	365
<i>bullata</i>	48, 50	<i>maritima</i>	365
<i>cascarilloides</i>	51	<i>portoricensis</i>	366
<i>cornifolia</i>	37, 39	<i>purpurascens</i>	365
<i>furfuracea</i>	60	<i>refracta</i>	366
<i>glabra</i>	15	<i>scabra</i>	367
<i>involucrata</i>	32	<i>secunda</i>	379
<i>jamaicensis</i>	67	<i>spiciformis</i>	366
<i>manihote</i>	30	<i>stricta</i>	365
<i>marcgravii</i>	25, 26, 27	<i>subbiflora</i>	380
<i>montana</i>	22	<i>swartziana</i>	365
<i>mucosa</i>	58, 59, 60	<i>Arizá</i>	152
<i>muricata</i>	32	<i>Arroz</i>	362
<i>obtusiflora</i>	58, 59	<i>Arthraxon</i>	277
<i>ponis</i>	26	<i>ciliaris</i> subsp. <i>quartinianus</i>	277
<i>prestoel</i>	32	<i>quartinianus</i>	277
<i>purpurea</i>	30	<i>Arthropogon</i>	291
<i>quinduenis</i>	62	<i>stipitatus</i>	291
<i>rhizantha</i>	64, 66	<i>Arthrostylidium</i>	379, 397
<i>Anona amarilla</i>	19, 43	<i>angustifolium</i>	400
<i>Anonastrum (section)</i>	4	<i>capillifolium</i>	379, 397
<i>Anoncillo de Paredon</i>	52	<i>cubense</i>	399
de Sabana.....	52	<i>distichum</i>	398
<i>Anonidium</i>	5	<i>excelsum</i>	399
<i>Anonilla</i>	45, 54	<i>fimbriatum</i>	398
<i>Anonita de papagayos</i>	55	<i>haitiense</i>	399
<i>Anthænantia lanata</i>	291	<i>multispicatum</i>	399
<i>Antheophora</i>	288	<i>obtusatum</i>	400
<i>elegans</i>	289	<i>prestoel</i>	398
<i>hermaphrodita</i>	289	<i>pubescens</i>	399
<i>villosa</i>	289	<i>sarmentosum</i>	398
<i>Anthistiria ciliata</i>	288	<i>urbanii</i>	398
<i>Anthoxanthum</i>	364	<i>Arundinaria capillifolia</i>	397
<i>odoratum</i>	364	<i>cubensis</i>	399
<i>Apluda zeugites</i>	392	<i>excelsa</i>	399
<i>Arana</i>	393	<i>microclada</i>	400
<i>Araticú apé</i>	8, 26	<i>multispicata</i>	399
do campo.....	29, 39	<i>obtusata</i>	400
dos lisos.....	29	<i>pubescens</i>	399
mí.....	40	<i>urbanii</i>	398
mirim.....	39	<i>Arundinella</i>	289
ñu.....	40	<i>berteroniana</i>	290
of the plains.....	29	<i>confinis</i>	290
ponhê.....	8, 26, 27	<i>cubensis</i>	290
<i>Arcytophyllum</i>	126	<i>deppeana</i>	290
<i>capitatum</i>	126, 127	<i>martinicensis</i>	290
<i>caracasatum</i>	126	<i>peruviana</i>	290
<i>caucanum</i>	127		

	Page.		Page.
<i>Arundo</i>	386	<i>Borreria</i>	122
<i>donax</i>	386, 402	<i>laevis</i>	122
<i>occidentalis</i>	386	<i>latifolia</i>	122
<i>phragmites</i>	386	<i>spinosa</i>	122
<i>saccharoides</i>	386	<i>tenella</i>	122
<i>sagittata</i>	386	Bosch-zuurzak	8, 25
<i>Atheropogon domingensis</i>	379	Bourgonia (section)	181, 219
<i>Atractanthus</i> (section)	15, 16	Bouteloua	379, 380
<i>Atropis carinata</i>	383	<i>americana</i> Pilger	380
<i>Atta</i> (section)	18, 41, 43, 45, 51	<i>americana</i> Scribn.	380
<i>Attas</i> (group)	16	<i>disticha</i>	381
(section)	16	<i>elattor</i>	380
<i>Avena</i>	372	<i>heterostega</i>	381
<i>fatua</i>	372	<i>humboldtiana</i>	381
<i>lutea</i>	401	<i>junccea</i>	379
<i>sativa</i>	372	<i>liligiosa</i>	380
<i>Aveneae</i>	265, 270	<i>porphyrantha</i>	381
<i>Axonopus</i>	299	<i> triana</i>	380
<i>appendiculatus</i>	300	<i>vancedeni</i>	379
<i>aureus</i>	300	<i>Brachiaria</i>	299
<i>capillaris</i>	300	<i>cruciformis</i>	299
<i>compressus</i>	300, 402	<i>plantaginea</i>	299
<i>digitatus</i>	293	<i>platyphylla</i>	299
<i>equitans</i>	301	<i>Bradburya angustifolia</i>	106
<i>macrostachyus</i>	301	<i>heteroneura</i>	106
<i>panicus</i>	295	<i>Breinspfelbaum</i>	79
<i>pellitus</i>	301	<i>Briza</i>	391
<i>Bahama grass</i>	373	<i>maxima</i>	394
<i>Balata</i>	250	<i>minor</i>	394
<i>Bamboo</i>	397, 401	<i>Bromus</i>	396
<i>Bambos</i>	401	<i>spicatus</i>	381
<i>latifolia</i>	401	<i>sterilis</i>	396
<i>nana</i>	401	<i>unioloides</i>	396
<i>vulgaris</i>	401	<i>virgatus</i>	384
<i>Bamboseae</i>	264, 271, 272, 397	<i>Brosimum alicastrum</i>	70
<i>Bambusa sieberi</i>	401	<i>costaricanum</i>	69
<i>Barba de indio</i>	277, 292, 374	<i>terrabanum</i>	69
<i>Basanacantha lasiantha</i>	134	<i>Brownea</i>	145, 147, 148, 149
<i>monantha</i>	134	<i>ariza</i>	146, 147, 148, 150, 151, 152
<i>pittieri</i>	134	<i>aroensis</i>	146, 152
<i>subcordata</i>	134	<i>birschellii</i>	146
<i>Becquerelia glomerulata</i>	88	<i>capitella</i>	146, 153
<i>Bejuco de garza</i>	256	<i>cauliflora</i>	146, 147, 155
<i>Bermuda grass</i>	373	<i>coccinea</i>	146, 147, 153, 154, 156
<i>Bistherium foliosum</i>	377	<i>grandiceps</i>	146, 148, 150, 151
<i>Bixa orellana</i>	83	<i>guaraba</i>	146, 152
<i>Bko</i>	82	<i>guyanensis</i>	146, 147
<i>Blue grass, annual</i>	395	<i>latifolia</i>	146, 147, 156
<i>Canada</i>	395	<i>leucantha</i>	146
<i>Boerhaavia</i>	98	<i>macrophylla</i>	146, 148, 149, 152, 154, 155
<i>grandiflora</i>	101	<i>neglecta</i>	146, 147
<i>plumbaginea</i>	101	<i>negrensis</i>	146, 147, 156
<i>repanda</i>	101	<i>racemosa</i>	147, 153
<i>squarrosa</i>	101	<i>rosa</i>	147, 156
<i>tuberosa</i>	101	<i>rosa-del-monte</i>	146, 147, 155, 156
<i>verticillata</i>	101	<i>rosa-montis</i>	156
<i>Bogamani</i>	144	<i>speciosa</i>	146, 147, 154
<i>Bogobano</i>	144	<i>Browneopsis</i>	147, 148, 149
<i>Bombacaceae</i>	143, 161	<i>cauliflora</i>	148
<i>Bombacopsis</i>	161, 162	<i>excelsa</i>	148, 149, 157
<i>fendleri</i>	163	<i>ucayalina</i>	148
<i>sessilis</i>	162	<i>Buena panamensis</i>	126
<i>Bombax</i>	159, 160	<i>Bulbostylis paradoxa</i>	88
<i>barrigon</i>	159, 160, 161	<i>Bumelia obovata</i>	167
<i>fendleri</i>	163	<i>Bullock's heart</i>	4, 19, 43
<i>sessile</i>	161	<i>Burgrass</i>	331, 354

	Page.		Page.
Caa-apoam.....	41	Cecropia longipes.....	227, 228
Cabeza de llama.....	31	maxonii.....	228
de negro.....	9, 10, 31	obtusa.....	227
Cabrera (section).....	299	ruiziana.....	228
Cacao tree.....	83	<i>Cenchropsis myosuroides</i>	355
Cachiman montagne.....	59	Cenchrus.....	354
morveux.....	59	brevisetus.....	356
Cactaceae.....	57	carolinianus.....	355, 356
Caesalpiniaceae.....	143, 148	ciliaris.....	354
Caguazo.....	319	distichophyllus.....	355
<i>Calicocca ipecacuanhae</i>	123	echinatus.....	356
Calliandra.....	104	forma longispina.....	355
pittieri.....	104	var. viridis.....	356
purdiaei.....	104	elliottii.....	355
Callicarpa.....	77	gracillimus.....	356
Calocarpum.....	76, 77, 82, 85	granularis.....	276
mammosum.....	77, 78, 81, 83, 84	hirsutus.....	401
sapota.....	77	insularis.....	356
viride.....	84, 85	laevigatus.....	289
Calocephalae (series).....	195, 198, 205, 221	macrocephalus.....	355
<i>Calospermum</i>	76, 77	microcephalus.....	356
mammosum.....	81	myosuroides.....	355
Calyptrocarya.....	87	parviflorus.....	401
fragifera.....	88	setosus.....	354
glomerulata.....	88	tribuloides.....	355
Camalote.....	357	var. macrocephalus.....	355
Camandula.....	272	viridis.....	356
Cambute.....	357	<i>Cephaelis axillaris</i>	123
Campyloneurum.....	124	costaricensis.....	123
Caña brava.....	401	elata.....	123
Caña de azúcar.....	273	muscosa.....	123
Cañamazo.....	318	psychotriacfolia.....	133
amargo.....	357	punicea.....	123
de sabana.....	301	tomentosa.....	123
dulce.....	300, 301	<i>Ceresia fluitans</i>	307
hembro.....	318	Cespedesia macrophylla.....	238
macho.....	301	Chacal haaz.....	82
Canary grass.....	364	Chaenanthera (section).....	249
Canavalia acuminata.....	107	<i>Chaetaria antillarum</i>	380
bicarinata.....	106	Chaetium.....	346
Cane, wild.....	386	cubanum.....	346
Canisté.....	86	Chaetochloa.....	346
Canistel.....	86	barbata.....	348
Cañuela.....	286	corrugata parviflora.....	401
Capillaria.....	324	geniculata.....	350, 351, 401
Capriola.....	373	glauca.....	351
dactylon.....	373	hispida.....	351
Carex hermaphrodita.....	88	imberbis.....	351
Carpel grass.....	300	geniculata.....	351
<i>Caryochloa bahiensis</i>	362	impressa.....	350
Cassia.....	102	italica.....	352
bacillaris.....	103	lutescens.....	351
caudata.....	102	magna.....	352
falcinella.....	102	onurus.....	349
grandis.....	103	palmifolia.....	348
inaequilatera.....	103	purpurascens.....	351
regia.....	103	rariflora.....	349
stenocarpa.....	104	salzmanniana.....	350
tagera.....	104	scandens.....	352
undulata.....	102	setosa.....	348, 349, 350
Cassupa.....	87	sulcata.....	348
alba.....	135	tenacissima.....	352
panamensis.....	133, 135	ventenatii.....	351
Caulanthos (section).....	181	verticillata.....	352
Cecropia arachnoidea.....	226	viridis.....	352
asperrima.....	227	vulpiseta.....	350
Isthmian species.....	228	Chalarium (section).....	108, 109

	Page.		Page.
<i>Chamaecrista</i>	102	<i>Ciponimastrum</i> (subsection).....	168
<i>patellaria</i>	104	<i>Citharexylum macradenium</i>	169
<i>simplex</i>	103	<i>macranthum</i>	169, 254, 254
<i>stenocarpa</i>	104	<i>macrochlamys</i>	254
<i>tagera</i>	104	<i>Citronella</i> grass.....	285
<i>Chamaeraphis parvigluma</i>	353	<i>Clematis virginiana</i>	117
<i>Chelonocarpus</i> (section).....	9, 16, 18	<i>Clytostoma isthmicum</i>	257
<i>Cherimola</i>	4, 16	<i>noterophilum</i>	253
<i>Cherimollae</i> (subsection).....	16	<i>Cockroach</i> grass.....	285
<i>Chirimoya</i> . See <i>Chirimoya</i> .		<i>Coelorachis impressa</i>	275
<i>Chick-peas</i>	55	<i>loricata</i>	275
<i>Chicle</i>	81	<i>Coix</i>	272
gum.....	79	<i>dactyloides</i>	272
<i>Chico</i>	79	<i>lacryma-jobi</i>	272
<i>Chicozapote</i>	76, 78, 79	<i>Combretum</i>	225, 239
<i>Chincua</i>	31	<i>alternifolium</i>	246, 247, 248
<i>Chirimoya</i>	19, 20, 40, 49, 59, 68	<i>argenteum</i>	240, 241, 244, 246
<i>cimarrona</i>	55	<i>benthamianum</i>	240, 241, 245
<i>de la barranca</i>	46	<i>coccineum</i>	240
<i>long-flowered</i>	19	<i>epiphyticum</i>	247
<i>wild, of Jamaica</i>	68	<i>erianthum</i>	240, 241, 245
<i>Chlorideae</i>	265, 270	<i>farinosum</i>	239,
<i>Chloris</i>	374	240, 241, 242, 243, 244, 246	
<i>aristata</i>	377	<i>phaenopetalum</i>	243
<i>bahiensis</i>	375	<i>jacquinii</i>	247
<i>barbata</i> Nash.....	377	<i>lepidopetalum</i>	240, 241, 245
<i>barbata</i> Swartz.....	376	<i>leprosum</i>	240
<i>brevigluma</i>	375	<i>loeflingii</i>	239
<i>caribaea</i>	375	<i>mellifluum</i>	240
<i>elliptica</i>	376	<i>nicotianum</i>	247
<i>eruciata</i>	375	<i>phaenopetalum</i>	240, 241, 243
<i>elegans</i>	376	<i>polystachyum</i>	240, 241, 243
<i>eleusinoides</i>	375	<i>punctulatum</i>	248
<i>vestita</i>	375	<i>sambuense</i>	240, 241, 243
<i>foliosa</i>	377	<i>section Micropetalae</i>	241
<i>glaucescens</i>	376	<i>superbum</i>	240, 241, 242
<i>Humboldtiana</i>	375	<i>warcewiczianum</i>	240, 245
<i>leptantha</i>	375	<i>Commicarpus</i>	98
<i>orthonotum</i>	376	<i>grandiflorus</i>	101
<i>paraguayensis</i>	376	<i>plumbagineus</i>	101
<i>penicillata</i>	376	<i>repandus</i>	101
<i>petraea</i>	374	<i>squarrosus</i>	101
<i>polydactyla</i>	377	<i>tuberosus</i>	101
<i>propinqua</i>	376	<i>verticillatus</i>	101
<i>radiata</i>	375	<i>Compsoeura</i>	145
<i>sagraeana</i>	375	<i>costaricensis</i>	144
<i>septentrionalis</i>	374, 375	<i>sprucei</i>	145
<i>swartziana</i>	374	<i>Cordia acuta</i>	252
<i>swartzii</i>	374	<i>aubletii</i>	253
<i>virgata</i>	376	<i>chepensis</i>	253
<i>Chomelia boliviana</i>	135, 136	<i>cylindrostachya</i>	253, 254
<i>brachyloba</i>	136, 137	<i>eristigma</i>	251
<i>filipes</i>	137	<i>lasicalyx</i>	251
<i>pohllana</i>	136	<i>littoralis</i>	253
<i>tenuiflora</i>	135, 136, 137	<i>mollis</i>	254
<i>Chondrachyum scabrum</i>	401	<i>nitida</i>	251, 252
<i>Christmas</i> grass.....	288	<i>peruviana</i>	254
<i>Christ's tears</i>	272	<i>riparia</i>	253
<i>Chrysophyllum panamense</i>	165	<i>trichostyla</i>	252
<i>Chrysopogon</i>	288	<i>Corkwood</i>	14
<i>pauciflorus</i>	288	<i>Cornucopiae perennans</i>	371
<i>Chul</i>	82	<i>Corossol batard</i>	23
<i>Chul-ul</i>	82	<i>sauvage</i>	35
<i>Chusquea</i>	400	<i>Corossolier batard</i>	24
<i>abietifolia</i>	400	<i>maron</i>	24
<i>Cierrate de escobilla</i>	105	<i>Cortaderia</i>	402
<i>Cinna glomerata</i>	284	<i>Cortedero</i>	319

	Page.		Page.
<i>Cosmibuena macrocarpa</i>	137	<i>Digitaria sanguinalis</i>	293
<i>ovalis</i>	137	<i>serotina</i>	294
<i>paludicola</i>	137	<i>setigera</i>	293
<i>Coumarouna oleifera</i>	233	<i>setosa</i>	293
<i>panamensis</i>	236	<i>Dimorphostachys pedunculata</i>	316
<i>Coussapoa asperifolia</i>	226	<i>Diodioides</i>	122
<i>brevipes</i>	225, 228	<i>Diospyros</i>	118
Central American species.....	228	<i>blepharophylla</i>	119
<i>fontanesiana</i>	223	<i>ciliata</i>	119, 119
<i>martiana</i>	226	<i>ebenaster</i>	120
<i>panamensis</i>	226	<i>ebeneum</i>	120
<i>villosa</i>	226	<i>gualanensis</i>	120
Crabgrass.....	293, 294	<i>palmeri</i>	119
<i>Crataegus mexicana</i>	47	<i>paralea</i>	120
<i>Crescentia cujete</i>	83	<i>rosel</i>	119, 120, 121
Crowfoot grass.....	382	<i>sonorae</i>	120
Cuajiniquill.....	178	<i>sphaerantha</i>	121
Cujin.....	207	<i>virginiana</i>	118, 119
Cujiniquill.....	207	<i>Diplachne carinata</i>	383
Custard apple.....	18, 47	<i>tarapacana</i>	383
common.....	18, 19	<i>verticillata</i>	383
hard-shelled.....	18	Dipterae (section).....	239
little, of the parrots.....	55	<i>Distichlis</i>	394
Custard apples.....	16	<i>maritima</i>	394
<i>Cymbopogon</i>	284	<i>spicata</i>	394
<i>citratus</i>	285	<i>Dolicholus angulatus</i>	107
<i>hirtus</i>	284	<i>calycosus</i>	108
<i>nardus</i>	285	<i>ixodes</i>	107
<i>Cynodon dactylon</i>	373	<i>phaseoloides</i>	108
<i>Cynosurus aegyptius</i>	382	<i>reticulatus</i>	107
<i>domingensis</i>	384	<i>Donatia</i> Bert.....	77
<i>indicus</i>	381	<i>Donatia</i> Forst.....	77
<i>virgatus</i>	383	<i>Donatia</i> Loebl.....	77
Cyperaceae.....	87	<i>Donax arundinaceus</i>	386
<i>Cyperus</i>	87	<i>Dormidera de escobilla</i>	105
<i>hermaphroditus</i>	88	<i>Drepanospron</i> (group).....	109
<i>Dactylis</i>	394	<i>Duggena</i>	125
<i>glomerata</i>	395	<i>asperula</i>	125
<i>Dactyloctenium</i>	382	<i>brachyantha</i>	125
<i>aegyptium</i>	382	<i>bracteosa</i>	125
<i>meridionale</i>	382	<i>grisea</i>	125
<i>Danthonia</i>	372	<i>hayesii</i>	125
<i>domingensis</i>	373	<i>leptantha</i>	125
<i>shrevei</i>	373	<i>mollis</i>	125
<i>Deppea floribunda</i>	138	<i>nivea</i>	125
<i>longipes</i>	138	<i>ovatifolia</i>	126
Devil's grass.....	373	<i>panamensis</i>	125, 126
<i>Diadema</i> (section).....	178, 181, 219	<i>petesia</i>	126
<i>Dichanthellium</i> (subgenus).....	322, 331	<i>pulverulenta</i>	126
<i>Dichanthium nodosum</i>	281	<i>rudis</i>	125
<i>Dichotoma</i>	322	<i>rugosa</i>	126
<i>Dichotomiflora</i>	324, 325	<i>sagraeana</i>	126
<i>Diectomis fastiglata</i>	279	<i>spicata</i>	126
<i>Diffusa</i>	327	<i>thyrsoides</i>	126
<i>Digitaria domingensis</i>	300, 401	<i>tomentosa</i>	126
<i>fimbriata</i>	294	<i>Duguetia</i>	58, 60, 61, 64, 65, 66
<i>foliosa</i>	307	<i>bracteosa</i>	67
<i>horizontalis</i>	293	<i>furfuracea</i>	61
<i>insularis</i>	292	<i>lanceolata</i>	60
<i>jamaicensis</i>	293	<i>longifolia</i>	64, 65
<i>leucophaea</i>	292	<i>rhizantha</i>	66
<i>longiflora</i>	294	Dutch grass.....	328
<i>marginata</i>	294	Dwarf Annonas.....	21
<i>platycaulis</i>	300	<i>anona</i>	45
<i>pulchella</i>	360	Dysanthae (series).....	204, 222
<i>repens</i>	402	<i>Eatonia obtusata</i>	372

	Page.		Page.
<i>Echinochloa</i>	345	<i>Eriochrysis</i>	273
<i>coloum</i>	345	<i>cayennensis</i>	273
<i>crusgalli</i>	345, 346	<i>Erythrina darienensis</i>	108
<i>cubensis</i>	402	<i>Espartillo</i>	370
<i>pyramidalis</i>	345	<i>Euadenocalymnae</i> (section).....	255
<i>sabulicola</i>	345	<i>Euannona</i> (section).....	7, 8, 9, 22, 25, 28, 30
<i>spectabilis</i>	346	<i>Eucoumarouna</i> (section).....	236
<i>walteri</i>	345	<i>Euinga</i> (section).....	197, 205, 222
<i>Eleusine</i>	381	<i>Eumiconia</i> (section).....	248
<i>indica</i>	381	<i>Eumimusops</i> (section).....	250
<i>mucronata</i>	382, 383	<i>Euphorbiaceae</i>	69
<i>procera</i>	393	<i>Eustachys petraea</i>	374
<i>virgata</i>	384	(section).....	374
<i>Elizabetha</i>	148, 149	<i>Eusymplocos</i> (section).....	168
<i>Embothrium grandiflorum</i>	231	<i>Eutapirira</i> (section).....	158
<i>ruizii</i>	230, 231	<i>Eutriana antillarum</i>	380
section <i>Oreocallis</i>	231	<i>heterostega</i>	381
<i>Eperua</i>	149	<i>juncea</i>	379
<i>Eragrostis</i>	387	<i>ledebouri</i>	379, 380
<i>acutiflora</i>	391	<i>Evea</i>	123
<i>airoides</i>	368	<i>axillaris</i>	123
<i>amabilis</i>	388	<i>campyloneuroides</i>	123
<i>arabica</i>	388	<i>dichroa</i>	124
<i>bahamensis</i>	390, 391	<i>elata</i>	123
<i>bahiensis</i>	391	<i>ipecacuanha</i>	123
<i>barrelieri</i>	390	<i>muscosa</i>	123
<i>berteroniana</i>	391	<i>tomentosa</i>	123
<i>cillianensis</i>	390	<i>Faramaea luteovirens</i>	138
<i>ciliaris</i>	388	<i>occidentalis</i>	139
<i>brachystachya</i>	388	<i>ovalis</i>	138
<i>laxa</i>	388	<i>salicifolia</i>	139
<i>conferta</i>	390	<i>scalaris</i>	139
<i>cubensis</i>	391	<i>Fasciculata</i>	324
<i>delicatula</i>	389	<i>Fescue, meadow</i>	395
<i>domingensis</i>	392	<i>Festuca</i>	395
<i>elliottii</i>	391	<i>bromoides</i>	395
<i>eragrostis</i>	390	<i>elatior</i>	395
<i>excelsa</i>	392	<i>fascicularis</i>	383
<i>gigantea</i>	392	<i>filiformis</i>	382
<i>glomerata</i>	390	<i>fournieriana</i>	384
<i>glutinosa</i>	390	<i>lariflora</i>	384
<i>hypnoides</i>	389	<i>myuros</i>	395
<i>leonina</i>	388	<i>phleoides</i>	372
<i>macropoda</i>	391	<i>polystachya</i>	383
<i>major</i>	390	<i>thouini</i>	402
<i>megastachya</i>	390	<i>Festuceae</i>	265, 270
<i>pilosa</i>	389	<i>Fiá</i>	82
<i>plumosa</i>	388	<i>Foxtail</i>	277
<i>poaeoides</i>	389	<i>green</i>	352
<i>prolifera</i>	391, 392	<i>yellow</i>	352
<i>purpurascens</i>	391, 392	<i>Fritillaria</i>	27
<i>purshii</i>	389	<i>Fusaea</i>	64
<i>refracta</i>	391	<i>longifolia</i>	65
<i>reptans</i>	389	(section).....	65
<i>sudana</i>	390	<i>Gama grass</i>	272
<i>tephrosanthos</i>	389	<i>Gamalote</i>	348
<i>Erianthus</i>	274	<i>Gamopetalum</i> (section).....	13, 37
<i>jamaicensis</i>	274	<i>Garbanzos</i>	55
<i>ravennae</i>	274	<i>Geanthemum</i>	66
<i>var. jamaicensis</i>	274	<i>cadavericum</i>	67
<i>saccharoides</i>	274	<i>rhizanthum</i>	66, 67
<i>Eriochloa</i>	298	(section).....	64, 66
<i>annulata</i>	298	<i>Geranium</i>	110
<i>filifolia</i>	329	<i>confertum</i>	111
<i>punctata</i>	298	<i>diffusum</i>	110
<i>var. subglabra</i>	299	<i>lindenianum</i>	110
<i>ramosa</i>	298	<i>sessiliflorum</i>	111
<i>subglabra</i>	299, 328	<i>stoloniferum</i>	110

	Page.		Page.
<i>Geranium subnudicaule</i>	110	<i>Guatteria</i>	6, 61
<i>velutinum</i>	111	<i>sessiliflora</i>	6
Giant reed.....	386	<i>Guapeba</i> (section).....	166
Ginger grass.....	331	<i>Guavo</i>	197
<i>Glabriflorae</i> (series).....	181, 182, 219	<i>de oso</i>	215
<i>Gomphrena decumbens</i>	91, 91, 92	<i>Guayaparín</i>	120
<i>genuina</i>	91	<i>Guettarda foliacea</i>	139
<i>grandifolia</i>	91	<i>ramuliflora</i>	139
<i>pringlei</i>	92	<i>Guimamé</i>	35
<i>dispersa</i>	91, 92	<i>Güin</i>	386
<i>latifolia</i>	94	<i>Guinea cimarrona</i>	363
<i>parviceps</i>	92	<i>corn</i>	286
<i>pringlei</i>	92	<i>grass</i>	329
<i>Goniorrhachis</i>	148	<i>Guisasillo</i>	351
<i>Gonzalagunia</i>	124	<i>Guizazo</i>	354
<i>brachyantha</i>	125	<i>Gum zapote</i>	78
<i>bracteosa</i>	125	<i>Gutta-percha</i>	250
<i>leptantha</i>	125	<i>Gymnopodae</i> (series).....	183, 220
<i>mollis</i>	125	<i>Gymnopogon</i>	377
<i>nivea</i>	125	<i>filiformis</i>	377
<i>ovatifolia</i>	126	<i>foliosus</i>	377
<i>petesia</i>	126	<i>laevis</i>	377
<i>pulverulenta</i>	126	<i>spicatus</i>	377
<i>rugosa</i>	126	<i>Gymnothrix domingensis</i>	353
<i>sagraeana</i>	126	<i>Gyncrium</i>	385, 386
<i>thyrsoides</i>	126	<i>saccharoides</i>	386
<i>tomentosa</i>	126	<i>sagittatum</i>	386
<i>Gonzalea</i>	124	<i>Haaz</i>	82
<i>asperula</i>	125	<i>Hackelochloa granularis</i>	276
<i>brachyantha</i>	125	<i>Hamelia chrysantha</i>	140
<i>bracteosa</i>	125	<i>pauciflora</i>	139
<i>grisea</i>	125	<i>Hanburyophyton</i> (section).....	256
<i>hayesii</i>	125	<i>Hard-shelled custard apple</i>	18
<i>leptantha</i>	125	<i>Hedyotis capitata</i>	126
<i>mollis</i>	125	<i>caracasana</i>	126
<i>nivea</i>	125	<i>cephalantha</i>	127
<i>ovatifolia</i>	126	<i>hartwegiana</i>	126
<i>panamensis</i>	126	<i>Helenium</i>	27
<i>petesia</i>	126	<i>Helogenia</i> (section).....	11, 34
<i>pulverulenta</i>	126	<i>Helopus punctatus</i>	298
<i>spicata</i>	126	<i>Hermesias</i>	145, 146, 156
<i>thyrsoides</i>	126	<i>Heteropogon</i>	287
<i>tomentosa</i>	126	<i>contortus</i>	287
<i>Goosegrass</i>	381	<i>Heterosteca juncifolia</i>	381
<i>Gossypianthus</i>	93	<i>rhadina</i>	381
<i>brittonii</i>	92	<i>Heterostemon</i>	148, 149
<i>lanuginosus</i>	93	<i>Hibiscus</i>	111, 112
<i>Gouinia</i>	384	<i>Hierba bruja</i>	328
<i>polygama</i>	384	<i>de Don Carlos</i>	286
<i>virgata</i>	384	<i>de limón</i>	285
<i>Gramma</i>	373	<i>del Paral</i>	328
<i>de caballo</i>	382	<i>Hoffmannia pittieri</i>	140
<i>pintada</i>	345	<i>Hokkoes</i>	81
<i>Gramón de costa</i>	357	<i>Holcus</i>	286
<i>Grosse zapotte</i>	82	<i>cubanicus</i>	402
<i>Guabito peludo</i>	205	<i>halepensis</i>	286
<i>Guadua latifolia</i>	401	<i>lanatus</i>	371
<i>Guamo</i>	197	<i>pertusus</i>	282
<i>de hierro</i>	175	<i>saccharoides</i>	283
<i>Guanábana</i>	26	<i>sorghum</i>	286
<i>Guanabani</i> (group).....	6, 7, 9, 11	<i>sudanensis</i>	286
(section).....	8	<i>striatus</i>	339
<i>Guanábano cimarrón</i>	24	<i>Homalocenchrus</i>	362
<i>Guanabanus</i>	26	<i>grandiflorus</i>	363

	Page.		Page.
<i>Homalocenchrus hexandrus</i>	363	<i>Inga chrysotricha</i>	202, 203, 223
<i>monandrus</i>	363	<i>ciliata</i>	221
<i>Hordeae</i>	264, 271	<i>cinnamomea</i>	181, 219
<i>Hordeum</i>	396	<i>cobanensis</i>	188, 220
<i>pusillum</i>	396	<i>coeleensis</i>	211, 223
<i>Hosmeca</i>	257	<i>codonantha</i>	202, 222
<i>Huicumo</i>	86	condition of knowledge	173
<i>Hymenachne</i>	340	<i>conferta</i>	223
<i>amplexicaulis</i>	340, 341	<i>cookii</i>	203, 223
<i>auriculata</i>	340	<i>cordistipula</i>	177, 178, 180, 181, 219
<i>fluvialilis</i>	340	group	178
<i>myurus</i>	340	<i>coruscans</i>	219
<i>patula</i>	340, 341	<i>cumingiana</i>	197
<i>striata</i>	339	<i>cycladenia</i>	184, 220
<i>Hypogynium spathiflorum</i>	280, 281	<i>cylindrica</i>	219
<i>Ibán</i>	79	<i>cynometrifolia</i>	218
<i>Ichnanthus</i>	333	<i>darienensis</i>	219
<i>axillaris</i>	334	<i>densiflora</i>	190, 191, 192, 220
<i>ichnodes</i>	335	<i>diadema</i>	219
<i>lelocarpus</i>	334	<i>disticha</i>	221
<i>mayarensis</i>	333	<i>dominicensis</i>	220
<i>nemoralis</i>	334	<i>donnell-smithii</i>	211, 223
<i>nemorosus</i>	334	<i>duckei</i>	181, 219
<i>pallens</i>	334	<i>dumosa</i>	220
<i>petiolatus</i>	335	<i>dysantha</i>	205, 222
<i>tenuis</i>	334	<i>edulis</i>	188, 193, 205, 216, 217, 223
<i>wrightii</i>	333	group	218
<i>Iguanero</i>	169	<i>eggertii</i>	221
<i>Ilama</i>	19, 31, 48	<i>eriocarpa</i>	212, 213, 214, 218, 223
<i>de Tehuantepec</i>	31	<i>erlorachis</i>	211, 217, 223
(section)	19	<i>expansa</i>	221
<i>Ilusión</i>	330, 389	<i>fagifolia</i>	219
<i>Imperata</i>	272, 401	<i>fasciculata</i>	223
<i>brasiliensis</i>	273	<i>fastuosa</i>	222
<i>caudata</i>	273, 321, 350	<i>fendleriana</i>	205, 222
<i>contracta</i>	273, 350	<i>ferrugineo-hirta</i>	222
<i>Inga</i>	181, 197	<i>feuillei</i>	197, 221
<i>acrocephala</i>	184, 185, 220	<i>fissicalyx</i>	213, 223
<i>acuminata</i>	195, 221	<i>flagelliformis</i>	218
<i>adenophylla</i>	210, 223	<i>fulgens</i>	199
<i>aestuariorum</i>	183, 187, 220	future publication by Mr. Pittier	174
<i>affinis</i>	223	<i>globulifera</i>	181
<i>aggregata</i>	182, 219	<i>goldmanii</i>	198, 201, 221
<i>alba</i>	182, 219	<i>graciliflora</i>	218
<i>bahiensis</i>	223	<i>gracilior</i>	220
<i>balaensis</i>	201, 202, 222	<i>guilleminiana</i>	202, 222
<i>bangii</i>	219	<i>hartii</i>	195, 221
<i>barbata</i>	202, 222	<i>hayesii</i>	193, 194, 220
<i>billbergiana</i>	181	<i>heterophylla</i>	174, 218
<i>biolleyana</i>	207, 222	<i>heteroptera</i>	221
<i>blanchetiana</i>	222	<i>hirsutissima</i>	194, 203, 222
<i>boliviana</i>	218	<i>hispida</i>	222
<i>bonplandiana</i>	220	<i>holtonii</i>	213, 214, 223
<i>bourgoni</i>	181, 182, 219	<i>hostmannii</i>	188, 220
<i>brachyptera</i>	221	<i>ingoides</i>	214, 217, 223
<i>brachyrachis</i>	219	<i>insignis</i>	205, 207, 210, 214, 222
<i>bracteosa</i>	221	group	215
<i>brevipes</i>	218	<i>jimeneziana</i>	208, 222
<i>bullata</i>	219	<i>jinicuili</i>	180, 219
<i>campanulata</i>	219	<i>juglandifolia</i>	220
<i>capitata</i>	182, 219	<i>latensis</i>	177, 218
<i>brevicalyx</i>	219	<i>lamprophylla</i>	216
<i>tenuior</i>	219	<i>lanceaefolia</i>	219
<i>cayennensis</i>	222	<i>langlassei</i>	189, 220
<i>chartacea</i>	191, 220	<i>lateriflora</i>	218

	Page.
<i>Inga latipes</i>	183, 220
<i>laurina</i>	182, 219
<i>lelocalycina</i>	187, 220
<i>lenticellata</i>	220
<i>lentiscifolia</i>	219
<i>leptantha</i>	193, 221
<i>leptoloba</i>	187, 188, 220
<i>leptopoda</i>	184, 185
<i>lindeniana</i>	196, 197, 198, 201, 221
<i>lineata</i>	220
<i>lomatophylla</i>	195, 221
<i>longiflora</i>	221
<i>longipes</i>	194, 220
<i>lucida</i>	199
<i>luschnathiana</i>	223
<i>macrantha</i>	220
<i>macrophylla</i>	221
<i>mapiriensis</i>	174, 218
<i>marginata</i>	182, 219
group.....	182
<i>maritima</i>	194, 220
<i>martinicensis</i>	220
<i>mathewsiana</i>	220
<i>maxoniana</i>	174, 218
<i>maynensis</i>	220
<i>meissneriana</i>	223
<i>membranacea</i>	219
<i>melchiana</i>	193, 194, 220
<i>micradenia</i>	221
<i>microcalyx</i>	219
<i>mollifoliola</i>	189, 193, 220
<i>monticola</i>	190, 220
<i>monzonensis</i>	220
<i>mucuna</i>	196, 198, 201, 221
<i>multicaulis</i>	202, 222
<i>multijuga</i>	187, 220
group.....	183
<i>myriantha</i>	178, 218
<i>myriocephala</i>	184, 185, 220
<i>negrensis</i>	221
<i>nitida</i>	220
<i>nobilis</i>	186, 220
<i>nuda</i>	221
<i>nutans</i>	219
<i>obtusata</i>	221
<i>oerstediana</i>	217, 223
<i>olivacea</i>	220
<i>organensis</i>	191, 221
<i>ornata</i>	214
<i>pachycarpa</i>	214
<i>pallida</i>	223
<i>panamensis</i>	199, 200, 207, 222
<i>panurensis</i>	174, 218
<i>pardoana</i>	218
<i>paterno</i>	177, 178, 179, 180, 181, 219
<i>pauciflora</i>	214, 218, 223
<i>pavoniana</i>	222
<i>peckii</i>	219
<i>peltadenia</i>	187, 220
<i>pezizifera</i>	219
<i>pilosiuscula</i>	221
<i>pinetorum</i>	185, 220
<i>pittieri</i>	201, 205, 206, 209, 210, 222
<i>platyptera</i>	221
<i>plumifera</i>	221

	Page.
<i>Inga poeppigiana</i>	196, 221
<i>popayanensis</i>	185, 220
<i>portobellensis</i>	177, 218
<i>preussii</i>	205, 207, 209, 222
<i>pringlei</i>	193, 221
<i>pruriens</i>	211
<i>punctata</i>	187, 220
<i>purpusii</i>	199, 222
<i>quaternata</i>	176, 218
group.....	175
<i>radians</i>	177, 178, 179, 180, 181, 219
<i>rensoni</i>	207, 209, 222
<i>rhabdotocalyx</i>	221
<i>rodrigueziana</i>	209, 222
<i>roussoviana</i>	175, 218
<i>rubiginosa</i>	211, 223
<i>rufescens</i>	181
<i>rufinervis</i>	184, 220
<i>rufiseta</i>	222
<i>rugosa</i>	222
<i>ruiziana</i>	187, 188, 220
<i>rusbyi</i>	179, 219
<i>saffordiana</i>	176, 218
<i>salzmänniana</i>	221
<i>sanctae-annae</i>	221
<i>sapindoides</i>	222
<i>scabriuscula</i>	223
<i>schinifolia</i>	219
<i>sciadion</i>	218
<i>sellowiana</i>	177
<i>semiglabra</i>	186, 220
<i>sertulifera</i>	178, 218
<i>sessilis</i>	202, 205, 222
<i>setifera</i>	221
<i>setosa</i>	202, 222
<i>sodiroi</i>	219
<i>sordida</i>	191, 221
<i>speciosa</i>	195, 221
<i>lomatophylla</i>	195
<i>spectabilis</i>	199, 200, 201, 222
<i>splendens</i>	189, 221
<i>spuria</i>	197, 212, 216, 217, 223
group.....	214
<i>standleyana</i>	204, 222
<i>stenocalyx</i>	219
<i>stenopoda</i>	192, 221
<i>stenoptera</i>	221
<i>stipularis</i>	181, 219
<i>striata</i>	193, 221
<i>strigillosa</i>	220
<i>subnuda</i>	217, 223
<i>tarapotensis</i>	177, 218
<i>tenuifolia</i>	219
<i>tenuirama</i>	219
<i>thibaudiana</i>	187, 220
<i>tomentosa</i>	219
<i>tonduzii</i>	222
<i>tubulifera</i>	181
<i>tuereckheimii</i>	192, 221
<i>ulei</i>	221
<i>umbellifera</i>	178, 218
<i>umbratica</i>	218
<i>uraguensis</i>	223
<i>ursi</i>	215, 223
<i>velutina</i>	221

	Page.		Page.
<i>Inga venosa</i>	222	<i>Khus-khus</i>	285
<i>vera</i>	217, 223	<i>Koeleria</i>	372
<i>lamprophylla</i>	216	<i>phleoides</i>	372
<i>portoricensis</i>	217	<i>Kóm-kra</i>	82
<i>typica</i>	216, 217	<i>Korób</i>	79
<i>vestita</i>	193, 222	<i>Kurók</i>	82
<i>villosissima</i>	222	<i>Lagrimas de Job</i>	272
<i>virescens</i>	192, 221	<i>Lancearia</i>	323
<i>virgultosa</i>	218	<i>Lappago aliena</i>	289
<i>vismiaefolia</i>	223	<i>Lasiacis</i>	335
<i>vulpina</i>	222	<i>compacta</i>	339
<i>weberbaueri</i>	222	<i>divaricata</i>	336, 337
<i>williamsii</i>	176, 218	<i>grisebachii</i>	336
<i>wittiana</i>	218	<i>harrisii</i>	336
<i>xalapensis</i>	213, 215, 218, 223	<i>ligulata</i>	337
<i>Ingerto</i>	85	<i>oaxacensis</i>	336
<i>Ipecacuanha officinalis</i>	123	<i>patentiflora</i>	338
<i>Iresine</i>	89, 94	<i>ruscifolia</i>	339
<i>acicularis</i>	93	<i>sloanei</i>	337, 338
<i>angustifolia</i>	96	<i>sorghoidea</i>	337, 338
<i>arbuscula</i>	97	<i>swartziana</i>	338
<i>arenaria</i>	93	<i>Laurel</i>	50
<i>argentata</i>	94, 98	<i>de cuabal</i>	21
<i>calea</i>	94	<i>Laxa</i>	325
<i>celosioides</i>	93, 95	<i>Laxiflora</i>	322
<i>obtusifolia</i>	95	<i>Laxiflorae</i> (subsection).....	251, 252
<i>costaricensis</i>	94, 98	<i>Leersia aspera</i>	363
<i>elatio</i>	96	<i>hexandra</i>	363
<i>latifolia</i>	94, 94	<i>monandra</i>	363
<i>lara</i>	94	<i>Leguminosae</i>	87
<i>nitens</i>	95	<i>Lemon grass</i>	285
<i>pacifica</i>	96	<i>Leptanthae</i> (series).....	193, 195, 221
<i>paniculata obtusifolia</i>	95	<i>Leptinga</i> (section).....	174, 176, 177, 181, 218
<i>rotundifolia</i>	96	<i>Leptochloa</i>	382
<i>schaffneri</i>	96, 97	<i>brachiata</i>	383
<i>stricta</i>	97	<i>domingensis</i>	384
<i>tomentella</i>	97	<i>fascicularis</i>	383
<i>wrightii</i>	97	<i>filiformis</i>	382
<i>Isachne</i>	341	<i>imbricata</i>	383
<i>angustifolia</i>	343	<i>longa</i>	384
<i>arundinacea</i>	343, 402	<i>mucronata</i>	383
<i>disperma</i>	343	<i>var. multiflora</i>	383
<i>dubia</i>	343	<i>nealleyi</i>	383
<i>leersioides</i>	342	<i>perennis</i>	384
<i>panicca</i>	343	<i>scabra</i>	383
<i>polygonoides</i>	343	<i>spicata</i>	381
<i>pygmaea</i>	342	<i>stricta</i>	383
<i>rigens</i>	342	<i>uninervia</i>	383
<i>rigidifolia</i>	342	<i>virgata</i>	383
<i>trachysperma</i>	343	<i>var. domingensis</i>	384
<i>Ischaemopogon latifolius</i>	274	<i>var. gracilis</i>	384
<i>Ischaemum</i>	274	<i>virletii</i>	383
<i>angustifolium</i>	274	<i>Leptocoryphum</i>	291
<i>latifolium</i>	274	<i>lanatum</i>	291
<i>rugosum</i>	274	<i>Leptostachys virgata</i>	384
<i>secundatum</i>	356	<i>Leptothrium</i>	289
<i>Jacaranda acutifolia</i>	259	<i>rigidum</i>	289
<i>caucana</i>	258, 259	<i>Limia</i> (section).....	170
<i>filicifolia</i>	259	<i>Lindackeria laurina</i>	164
<i>gualanday</i>	259	<i>Lithachne</i>	358
<i>lasiogyne</i>	259	<i>axillaris</i>	358
<i>mimosifolia</i>	259	<i>pauciflora</i>	358
<i>Job's tears</i>	272	<i>pineti</i>	358
<i>Johnson grass</i>	286	<i>Lolium</i>	396
<i>Juglans regia</i>	67	<i>multiflorum</i>	396
<i>Kangaroo grass</i>	288	<i>temulentum arvense</i>	396
<i>Khas-khas</i>	285	<i>Longiflorae</i> (series).....	195, 196, 202, 205, 221

	Page		Page.
Lopimia	114	Manisuris	275
<i>dasypetala</i>	114	<i>aurita</i>	276
<i>malacophylla</i>	114, 115	<i>exaltata</i>	275
Lucuma	76	<i>granularis</i>	276
<i>argoacoensis</i>	83	<i>impressa</i>	275
<i>bonplandia</i>	81	<i>leonina</i>	275
<i>glomerata</i>	167	<i>loricata</i>	275
<i>mammosa</i>	81	Manzana	83
<i>multiflora</i>	86	<i>Mariscus jaquinii</i>	88
<i>palmeri</i>	86	Marmalade fruit	82
<i>procera</i>	166	Máry grass	348
<i>salicifolia</i>	85, 86	Mayna laurina	164
<i>sambuensis</i>	167	Meadow fescue	395
<i>sclerocarpa</i>	166	<i>Megastachya berteroniana</i>	391
<i>standleyana</i>	166	<i>uninervia</i>	383
Lundia obliqua	258	Meibomia maxonii	108
<i>puberula</i>	258	Melinideae	264, 266
Luziola	361	Mesosetum	297
<i>alabamensis</i>	362	<i>loliiforme</i>	298
<i>bahiensis</i>	361, 362	<i>wrightii</i>	298
<i>longivalvula</i>	362	Mespilus germanica	78
<i>peruviana</i>	361	Miconia darienensis	248
<i>spruceana</i>	362	<i>fulva</i>	249
Maba	118	<i>poeppegii</i>	249
<i>acapuleensis</i>	118, 119	<i>pyrifolia</i>	249
<i>albens</i>	118, 119	Micropetalae (section)	239
<i>intricata</i>	118, 119	Milium compressum	300
<i>latifolia</i>	118	<i>digitatum</i>	293
<i>pavonii</i>	118	<i>lanatum</i>	291
<i>salicifolia</i>	118	<i>nemorosum</i>	334
<i>verae-crucis</i>	119	<i>panicum</i>	295
Macho	154	<i>punctatum</i>	298
Macreightia (section)	118	<i>ramosum</i>	298
Macrolobium	148, 149	<i>rigidifolium</i>	342
<i>floridum</i>	233	<i>rigidum</i>	342
Macroluma (section)	166	<i>villosum</i>	292
Malache	113, 114, 115	Millet	352
<i>arachnoidea</i>	117	<i>broomcorn</i>	328
<i>fulva</i>	115	<i>hog</i>	328
<i>leucantha</i>	117	Millo	286
<i>maxonii</i>	116	Mimosa	104, 199
<i>panamensis</i>	116, 117	<i>alba</i>	182
<i>penduliflora</i>	117	<i>albida</i>	105
<i>peruviana</i>	116	<i>debilis</i>	105
<i>rosea</i>	115	<i>panamensis</i>	104
<i>typhalaea</i>	115	<i>panamensis</i>	104
<i>warmingiana</i>	116	<i>spectabilis</i>	200
Malachra	113	<i>williamsii</i>	105
<i>trinervis</i>	113	Mimoseae, notes by Benth	181
Mallostoma lamarum	127	Mimusops darienensis	225, 249, 250
<i>shannoni</i>	128	<i>longifolia</i>	250
Malojilla	299, 328	<i>spectabilis</i>	250
Malvaceae	87, 111, 113, 114	Mirabilis	98
subfamily <i>Hibisceae</i>	112	<i>arenaria</i>	101
Malvecino	234	<i>campanulata</i>	101
Mamey	82	Mispelboom	79
<i>colorado</i>	82	Mniochloa	360
<i>de Cartagena</i>	86	<i>pulchella</i>	360
<i>zapote</i>	82	<i>strephioides</i>	360
Mammea americana	78, 83	<i>Moenchia speciosa</i>	321, 322
Mammee	78	<i>Monachne punctata</i>	298
Mammee-sapote	82	<i>subglabra</i>	299
Manilkaria (section)	250	Monanthochloë	385
Manirito	37	<i>littoralis</i>	385
Manirote	10, 31, 32, 37	Monkey pacai	197

	Page.		Page.
<i>Morinda muscosa</i>	123	<i>Orthoclada</i>	393
<i>Morongia</i>	104	<i>laxa</i>	393
<i>distachya</i>	106	<i>rariflora</i>	393
<i>pilosa</i>	105	<i>Orthopogon cubensis</i>	344
Mountain soursop.....	24	<i>hirtellus</i>	344
<i>Muhlenbergia</i>	367	<i>loliaceus</i>	344
<i>berteroniana</i>	290	<i>setarius</i>	344
<i>capillaris</i>	367	<i>Oryza</i>	362
<i>spicata</i>	378	<i>hexandra</i>	363
<i>Multijugatae</i> (section).....	148	<i>latifolia</i>	362
<i>Muy</i>	79	<i>monandra</i>	363
<i>Muyozapot</i>	79	<i>grandiflora</i>	363
<i>Myxa</i> (section).....	251, 252, 254	<i>sativa</i>	362
<i>Naseberry</i>	81	<i>latifolia</i>	362
tree.....	79	<i>Oryzeae</i>	264, 269
Natal grass.....	346	<i>Oxydenia virgata</i>	384
<i>Navicularia lanata</i>	334	<i>Pacai</i>	197
<i>Navo</i>	189	de mono.....	197
<i>Nazla</i>	289	monkey.....	197
<i>aliena</i>	289	<i>Pacay</i>	203
<i>Nazlaeae</i>	264, 266	<i>Pachira</i>	159, 160
<i>Neea</i>	98	<i>aquatica</i>	160, 161
<i>delicatula</i>	98	<i>fendleri</i>	161, 163
<i>psychotrioides</i>	99	<i>insignis</i>	160
Negro head.....	10, 31	<i>macrocarpa</i>	160
<i>Nispero</i>	76, 78, 79	<i>sessilis</i>	161, 162
de monte.....	80	<i>villosula</i>	161
<i>quitense</i>	79	<i>Pacholi</i>	285
<i>Notholcus</i>	371	<i>Pachuli</i>	285
<i>lanatus</i>	371	<i>Palicourea</i>	141
<i>Oa-bo</i>	82	<i>chiriquina</i>	140
Oat, cultivated.....	372	<i>heterantha</i>	141
wild.....	372	<i>mexicana</i>	140
Oats, seaside.....	393	<i>Palo de cruz</i>	150
wild.....	361	de sangre.....	147
<i>Oblongiflorae</i> (subsection).....	16	<i>Palovea</i>	148, 149
<i>Oedipachne punctata</i>	298	<i>Panama flora, relations</i>	87
Old woman's head.....	31	<i>Panicatae</i>	264
<i>Olyra</i>	357	<i>Paniceae</i>	264, 267
<i>arundinacea</i>	357	<i>Paniculares</i> (subsection).....	248
<i>axillaris</i>	358	<i>Panicum</i>	322, 333
<i>ciliatifolia</i>	358	<i>aciculare</i>	331
<i>latifolia</i>	335, 357, 358	<i>acuminatum</i>	332
var. <i>arundinacea</i>	357	<i>albomarginatum</i>	332
<i>nana</i>	360	<i>alsinoides</i>	334
<i>paniculata</i>	357	<i>altum</i>	329
<i>pauciflora</i>	358	<i>amarulum</i>	329
<i>pineti</i>	358	<i>amphibolum</i>	350
<i>semiovata</i>	358	<i>amphistemon</i>	341
<i>strepnioides</i>	360	<i>amplexicaule</i>	340
<i>Oncoba laurina</i>	164	<i>amplifolium</i>	350
<i>Opizla</i>	384	<i>antillarum</i>	353
<i>stolonifera</i>	385	<i>aquaticum</i> Bosc.....	339
<i>Oplismenus</i>	343	<i>aquaticum</i> Poir.....	328
<i>burmanni</i>	344	<i>arenicoloides</i>	331
<i>cristatus</i>	344	<i>argyrostachyum</i>	294
<i>cubensis</i>	344	<i>aristatum</i>	345
<i>hirtellus</i>	344, 402	<i>arundinaceum</i>	343
<i>jamaicensis</i>	345	<i>auriculatum</i>	340
<i>loliaceus</i>	344	<i>axillare</i>	334
<i>setarius</i>	334, 344	<i>bambusoides</i>	336, 337
<i>tenuis</i>	334	<i>barbatum</i>	348
<i>undulatifolius</i>	344	<i>barbinode</i>	327
<i>Opuntias</i>	57	<i>berteronianum</i>	351
Orchard grass.....	395	<i>boliviense</i>	330
<i>Oreocallis</i> (section).....	231	<i>brachiatum</i>	348, 349
<i>ruizii</i>	230	<i>burmanni</i>	344

	Page.
<i>Panicum caeruleum</i>	332
<i>caricoides</i>	329
<i>carthaginense</i>	328
<i>caudatum</i>	348
<i>cenchrroides</i>	355
<i>chamaeloncho</i>	332
<i>chapmani</i>	327
<i>chauvini</i>	337
<i>chrysites</i>	300
<i>chrysopsidifolium</i>	331
<i>colonum</i>	345
<i>compactum</i>	339
<i>condensum</i>	329
<i>confertum</i>	402
<i>costatum</i>	348
<i>cubense</i>	344
<i>curvinerve</i>	295
<i>cyanescens</i>	330
<i>dactylon</i>	373
<i>decumbens</i>	316
<i>diffusum</i>	329
<i>dispermum</i>	343
<i>dissectum</i>	306
<i>distantiflorum</i>	327
<i>divaricatum</i>	336
<i>puberulum</i>	337
<i>stenostachyum</i>	337
<i>domingense</i>	295, 401, 402
<i>duchassaingii</i>	292
<i>dumetorum</i>	349
<i>durum</i>	341
<i>eggersti</i>	292
<i>elliottianum</i>	339
<i>erectifolium</i>	332
<i>erucaeforme</i>	299
<i>exiguiflorum</i>	330
<i>falsum</i>	292
<i>fasciculatum</i>	348
<i>flavescens</i>	348
<i>frondescens</i>	330
<i>fruticosum</i>	337
<i>fusiflorum</i>	291
<i>fusiforme</i>	331
<i>geminatum</i>	327
<i>geniculatum</i>	350
<i>ghiesbreghtii</i>	329
<i>gibbum</i>	339, 340
<i>glaucum</i>	351
<i>glutinosum</i>	331, 337
<i>grande</i>	333
<i>grisebachii</i>	336
<i>hamiltonii</i>	293
<i>hirsutum</i>	329
<i>hirtellum</i>	344
<i>hirtum</i>	338
<i>horizontale</i>	293
<i>hymenachne</i>	340
<i>ichnodes</i>	335
<i>imberbe</i>	351
<i>impressum</i>	350
<i>ineptum</i>	331
<i>insulare</i>	292
<i>ischaemum</i>	294
<i>jamaicense</i>	345
<i>joorii</i>	332

	Page.
<i>Panicum lagotis</i>	335
<i>lanatum</i>	292, 338, 339
<i>sorghoideum</i>	338
<i>lancearium</i>	332
<i>latifolium</i>	337, 338
<i>laxum</i>	330
<i>leiocarpon</i>	334
<i>leptochyrium</i>	353
<i>leucophaeum</i>	292
<i>leucothrix</i>	332
<i>loliiforme</i>	298
<i>longiflorum</i>	294
<i>lutescens</i>	351
<i>martinianum</i>	334
<i>martinicense</i>	338, 339
<i>maximum</i>	329
<i>mayanense</i>	333
<i>megiston</i>	331
<i>milleflorum</i>	330
<i>millegrana</i>	331
<i>monobotrys</i>	321
<i>monostachyum</i>	311, 321
<i>multinerve</i>	343
<i>multirameum</i>	332
<i>myosurus</i>	340
<i>myuros</i>	340
<i>nemorale</i>	334
<i>nemorosum</i>	334
<i>neuranthum</i>	331
<i>nitidum</i>	331
<i>oaxacense</i>	336
<i>ocreatum</i>	402
<i>onurus</i>	348, 349, 350
<i>oxyanthum</i>	302
<i>pallens</i>	334
<i>palmaefolium</i>	348
<i>palmifolium</i>	348
<i>paniculatum</i>	317
<i>paractenioides</i>	349
<i>parvifolium</i>	330
<i>penicillatum</i>	351
<i>petiolatum</i>	335
<i>phleiforme</i>	340
<i>pilosum</i>	330
<i>plicatum</i>	348
<i>var. haitiense</i>	348
<i>polycaulon</i>	331
<i>polygonatum</i>	330
<i>polygonoides</i>	343
<i>polystachyum</i>	340
<i>portoricense</i>	332
<i>praegnans</i>	337
<i>pulchellum</i>	330
<i>pyramidale</i>	345
<i>rariflorum</i>	393
<i>repens</i>	329
<i>restitutum</i>	349
<i>rigens</i>	342
<i>rigidifolium</i>	342
<i>roanokense</i>	332
<i>rohril</i>	402
<i>rudgel</i>	331
<i>rugelii</i>	336
<i>ruscifolium</i>	336, 339
<i>sabulicola</i>	345

	Page.		Page.
<i>Panicum saccharoides</i>	292, 321, 322	<i>Paspalum compressum</i>	300
<i>sanguinale</i>	293	<i>conjugatum</i>	318
var. <i>simpsoni</i>	294	<i>pubescens</i>	318
<i>schiffneri</i>	330	var. <i>subcordatum</i>	402
<i>scoparium</i>	332	<i>convexum</i>	311
<i>setarium</i>	314	<i>coryphaeum</i>	320
<i>setosum</i>	348, 349, 350	<i>cubense</i>	363
<i>simpsoni</i>	294	<i>debile</i>	316
<i>sloanei</i>	338	<i>decumbens</i>	316
<i>sorghoideum</i>	338, 339	<i>densum</i>	320, 402
<i>spectabile</i>	346	<i>denticulatum</i>	309
var. <i>guadeloupense</i>	345	<i>digitatum</i>	293
<i>sphaerocarpum</i>	350	<i>dilatatum</i>	318
<i>stenodes</i>	329	<i>dissectum</i>	306, 307
<i>stenodoides</i>	329	<i>distachyon</i>	308
<i>stevensianum</i>	330	<i>distichum</i>	308
<i>stoloniferum</i>	330	<i>vaginatum</i>	307
<i>striatum</i>	339	<i>dolichophyllum</i>	312
<i>strigosum</i>	331	<i>elatum</i>	311
<i>sulcatum</i>	318	<i>elegans</i>	321
<i>swartzianum</i>	338, 339	<i>erasperatum</i>	300
<i>tenacissimum</i>	352	<i>fasciculatum</i>	318
<i>tenerum</i>	329	<i>filiforme</i>	312
<i>thrasya</i>	296	<i>filostachyum</i>	300, 301
<i>trachyspermum</i>	343	<i>fimbriatum</i>	311
<i>trichanthum</i>	330	<i>fluitans</i>	307
<i>trichoides</i>	330	<i>foliosum</i>	307
<i>trigonum</i>	331	<i>glabrum</i>	314, 315, 402
<i>truei</i>	327	<i>gracile</i>	313
<i>unispicatum</i>	321	<i>guadaloupense</i>	402
<i>utowanaeum</i>	327	<i>helleri</i>	314, 315
<i>viaticum</i>	348	<i>hemicyptum</i>	311
<i>vileoides</i>	340	<i>hemisphericum</i>	316, 317
<i>virgatum cubense</i>	326, 329	<i>heterophyllum</i>	314
<i>viride</i>	352	<i>heterotrichon</i>	307
<i>viscidellum</i>	332	<i>paucispicatum</i>	307
<i>wrightianum</i>	332	<i>inflatum</i>	307
<i>xalapense</i>	331	<i>koleopodium</i>	402
<i>zizanioides</i>	333	<i>lagascae</i>	402
<i>Pappophorum</i>	385	<i>lanatum</i>	291
<i>alopecuroideum</i>	385	<i>lanceaefolium</i>	314
<i>laguroideum</i>	385	<i>lenormandi</i>	317
<i>Pará grass</i>	327	<i>leoninum</i>	313
<i>Paraná</i>	328	<i>leptocaulon</i>	312
<i>Paratheria</i>	358	<i>leucocheillum</i>	319
<i>prostrata</i>	358	<i>lindenianum</i>	312
<i>Pariana sylvestris</i>	396	<i>lineare Swartz</i>	312
<i>Paritium</i>	112	<i>lineare Trin</i>	312
<i>Parvifolia</i>	326	<i>lividum</i>	309
<i>Paspalum</i>	302	<i>lloydii</i>	316
<i>alterniflorum</i>	312	<i>longiflorum</i>	294
<i>angustifolium</i>	311	<i>longifolium</i>	312
<i>antillense</i>	309, 310	<i>megaphyllum</i>	312
<i>appendiculatum</i>	300	<i>melanospermum</i>	311
<i>bakeri</i>	315	<i>membranaceum</i>	306
<i>boscianum</i>	310, 311	<i>miliare</i>	314
<i>brachiatum</i>	307, 308	<i>millioideum</i>	314
<i>breve</i>	314	<i>millegrana</i>	320
<i>caespitosum</i>	314, 317, 402	<i>minus</i>	309
<i>capillare</i>	300	<i>minutum</i>	300
<i>capillifolium</i>	313	<i>molle</i>	402
<i>caudicatum</i>	312	<i>multicaule</i>	317
<i>ciliatifolium</i>	315	<i>nanum</i>	312
<i>cilliferum</i>	316	<i>necsii</i>	311
<i>clavuliferum</i>	317	<i>notatum</i>	309

	Page.		Page.
<i>Paspalum nutans</i>	316, 402	<i>Pavonia speciosa</i>	113
<i>olivaceum</i>	310	<i>velutina</i>	114
<i>orbiculatum</i>	317, 402	<i>Pega-pegæa</i>	352
<i>paniculatum</i>	316, 402	<i>Peltaca</i>	113
<i>minor</i>	317	<i>ovata</i>	113
<i>panicum</i>	402	<i>riedelii</i>	113
<i>papillosum</i>	317	(section).....	113
<i>parviflorum</i>	317	<i>sessiliflora</i>	113
<i>pedunculatum</i>	316	<i>speciosa</i>	113
<i>pellitum</i>	301	<i>Pennisetum</i>	353
<i>pilosum</i>	311, 321	<i>alopecuroides</i>	354
<i>platicaulon</i>	300, 301	<i>americanum</i>	351
<i>platyphyllum</i>	299	<i>antillarum</i>	353
<i>plicatulum</i>	309, 310	<i>cenchröides</i>	354
<i>poiretii</i>	313, 317	<i>ciliare</i>	354
<i>polystachyum</i>	321	<i>domingense</i>	353
<i>portoricense</i>	314	<i>erubescens</i>	354
<i>propinquum</i>	315	<i>glaucum</i>	351
<i>psammophilum</i>	316	<i>hamiltonii</i>	354
<i>pubescens</i>	402	<i>orientale triflorum</i>	354
<i>pubiflorum</i>	308	<i>pungens</i>	355
<i>pulchellum</i>	321	<i>setosum</i>	354
<i>pulehrum</i>	300	<i>swartzii</i>	349
<i>pumilum</i>	309	<i>triflorum</i>	354
<i>pusillum</i>	317	<i>Perotis cubana</i>	346
<i>racemosum</i>	307	<i>Persea gratissima</i>	83
<i>repens</i>	307	<i>Persimmon, common</i>	118
<i>reptatum</i>	318, 402	<i>Phalaridææ</i>	264, 269
<i>rhizomatosum</i>	402	<i>Phalaris</i>	364
<i>richardii</i>	314	<i>canariensis</i>	364
<i>rigidifolium</i>	315	<i>zizanioides</i>	285
<i>rottboellioides</i>	312	<i>Pharus</i>	360
<i>rupestre</i>	313	<i>brasiliensts</i>	361
<i>saccharoides</i>	321	<i>glaber</i>	361
<i>schreberianum</i>	320	<i>lanceifolius</i>	361
<i>scrobiculatum</i>	311	<i>latifolius</i>	361
<i>secans</i>	319	<i>ovalifolius</i>	361
<i>serpentinum</i>	309	<i>parvifolius</i>	361
<i>serratum</i>	306, 307	<i>Phaseolus chiriquinus</i>	109
<i>setaceum</i>	315	<i>multiflorus</i>	109
<i>simpsoni</i>	314	<i>Phelloxylon (section)</i>	8, 9, 14, 16
<i>sinuosum</i>	402	<i>Phleum</i>	367
<i>stoloniferum</i>	307	<i>pratense</i>	367
<i>strictum</i>	402	<i>Phragmites</i>	386, 402
<i>swartzianum</i>	312	<i>martinicensis</i>	386
<i>taphrophyllum</i>	309	<i>phragmites</i>	386
<i>underwoodii</i>	320	<i>Pigeon grass</i>	352
<i>undulatum</i>	303, 310	<i>Pilæfloræ (group)</i>	9, 10
<i>unispicatum</i>	321	<i>Pilannona (section)</i>	12, 13, 36
<i>vaginatum</i>	307, 308	<i>Pilosiusculæ (series)</i>	188, 193, 220
<i>vaginiflorum</i>	316	<i>Pinaloua</i>	66
<i>virgatum</i>	319	<i>Pine nuts</i>	46
<i>var. jacquinianum</i>	319	<i>Pinus cembra</i>	46
<i>var. schreberianum</i>	320	<i>Piptatherum confine</i>	290
<i>var. stramineum</i>	319	<i>setosum</i>	287, 402
<i>wrightii</i>	310	<i>Pisonia</i>	98
<i>Pata de gallina</i>	294, 373, 374, 382	<i>areolata</i>	100
<i>finæ</i>	293	<i>boliviana</i>	100
<i>Paterno</i>	179, 180	<i>cafferiana</i>	100
<i>Paurochaetium (subgenus)</i>	322, 327	<i>campestris</i>	100
<i>Pavonia</i>	113, 114	<i>combretiflora</i>	100
<i>bracteosa</i>	113	<i>coriifolia</i>	100
<i>dasyptala</i>	114	<i>cuspidata</i>	100
<i>geminiflora</i>	117	<i>eggersiana</i>	100
<i>riedelii</i>	113	<i>ferruginea</i>	100
<i>sessiliflora</i>	113	<i>fragrans</i>	100

	Page.		Page.
<i>Pisonia graciliflora</i>	100	<i>Polypogon filiformis</i>	363
<i>harrisiiana</i>	100	<i>littoralis</i>	371
<i>hassleriana</i>	100	<i>monspeliensis</i>	371
<i>hirsuta</i>	100	<i>spicatus</i>	377
<i>inermis</i>	100	Pomme-cannelle.....	18
<i>laxiflora</i>	100	Pond-grass.....	362
<i>ligustrifolia</i>	100	Prickly apple.....	24
<i>linearibracteata</i>	100	Psammogenia (section).....	8, 30
<i>luteovirens</i>	100	Pseudinga (section).....	182, 205, 219
<i>microphylla</i>	100	Pseudingae-Dysanthae.....	205
<i>nitida</i>	101	<i>vulpinae</i>	204
<i>noxia</i>	101	Psychotria.....	128
<i>obtusata</i>	99	<i>aggregata</i>	128
<i>domingensis</i>	100	<i>albonervia</i>	131
<i>olfersiana</i>	101	<i>arcuata</i>	131
<i>pacurero</i>	101	<i>calophylla</i>	129
<i>paraguayensis</i>	101	<i>carthaginensis</i>	132
<i>pernambucensis</i>	101	<i>chiriquina</i>	129
<i>salicifolia</i>	101	<i>crassa</i>	132
<i>schomburgkiana</i>	101	<i>fendleri</i>	129
<i>suspensa</i>	101	<i>goldmanii</i>	130
<i>tomentosa</i>	101	<i>granadensis</i>	130
<i>uleana</i>	101	<i>insignis</i>	130
<i>venosa</i>	101	<i>inundata</i>	131
<i>Pithecolobium</i>	174, 181, 182	<i>leiocarpa</i>	130
<i>glomeratum</i>	181	<i>magna</i>	131
<i>rufescens</i>	181	<i>panamensis</i>	132
<i>tubuliferum</i>	181	<i>peperomiae</i>	132
<i>Pitillo</i>	344	<i>pittieri</i>	132
<i>Pito de bejuco</i>	337	<i>psychotriacfolia</i>	133
<i>Pito enano</i>	358	<i>Ptychophyllum</i>	347
<i>Planotia</i>	400	<i>Rabdochloa cruciata</i>	375
<i>virgata</i>	400	<i>imbricata</i>	383
<i>Platonia virgata</i>	400	<i>mucronata</i>	382
<i>Platypodium elegans</i>	235	Rabo de gato.....	351
<i>maxonianum</i>	234	<i>zorra</i>	283, 292
<i>Poa</i>	395	Raddia.....	358, 359
<i>acutiflora</i>	391	<i>biformis</i>	358
<i>amabilis</i>	388	<i>distichophylla</i>	360
<i>annua</i>	395	<i>nana</i>	360
<i>berteroniana</i>	391	<i>polypodiodes</i>	360
<i>cilianensis</i>	390	<i>urbaniana</i>	359
<i>ciliaris</i>	388	Raimondia.....	5, 18, 53, 61, 63, 64
<i>compressa</i>	395	<i>monoica</i>	61, 62, 63
<i>conferta</i>	390	<i>quinduensis</i>	62, 63
<i>domingensis</i>	392	Rastinga.....	41
<i>eragrostis</i>	390	Redtop.....	371
<i>glomerata</i>	390	Reed grass.....	386
<i>glutinosa</i>	390	<i>Reimaria brasiliensis</i>	302
<i>hypnoides</i>	389	<i>conferta</i>	302
<i>infirmia</i>	395	<i>diffusa</i>	402
<i>nitida</i>	391	<i>elegans</i>	321
<i>pilosa</i>	389	<i>laxa</i>	292
<i>plumosa</i>	388	<i>oligostachya</i>	302
<i>prolifera</i>	392	Reimarochloa.....	302
<i>purpurascens</i>	391	<i>brasiliensis</i>	302
<i>reptans</i>	389	<i>oligostachya</i>	302
<i>rigida</i>	396	Rescue grass.....	396
<i>virgata</i>	393	Restinga.....	41
<i>Poatae</i>	264	Reynaudia.....	363
<i>Podospermum virens</i>	290	<i>filiformis</i>	363
<i>Pollinia brevifolia</i>	279	<i>Rhachicallis capitata</i>	126
<i>microstachya</i>	280	<i>caracasana</i>	126
<i>Polyodon distichum</i>	381	Rhaphis.....	288
<i>Polypogon</i>	370	<i>pauciflora</i>	288
<i>cubensis</i>	363	Rhapis.....	288

	Page.		Page.
<i>Rhytachne rottboelliioides</i>	274	<i>Salacia blepharodes</i>	159
Rice.....	362	Salt grass.....	394
grass.....	275	Sal-tui.....	82
<i>Richardella salicifolia</i>	85	Salzmannia.....	29
Ridging grass.....	283	San Juan de Castillo.....	328
Rollinia.....	13, 58, 61	Sand bur.....	354
emarginata.....	55	<i>Sanguinaria vaginata</i>	307
longifolia.....	58	<i>Sapium biglandulosum</i>	74
mucosa.....	5, 58, 59, 60	<i>hemsleyanum</i>	73, 75
orthopetala.....	60	hippomane.....	73, 75
pulcherrima.....	60	<i>obtusilobum</i>	73, 74, 75
sieberi.....	58, 60	<i>thomsoni</i>	72
silvatica.....	5	tolimense.....	72
<i>Rondeletia secunda</i>	141	utile.....	74, 75
Rosa.....	154, 156	verum.....	70, 71, 72
de montana.....	150	Sapodilla.....	76, 78, 81
del monte.....	156	tree.....	79, 80, 81
guaraba.....	152	wood.....	81
macho.....	152	Saponemas.....	108
Roso.....	154	<i>Sapota achras</i>	78
<i>Rottboellia aurita</i>	276	<i>zapotilla</i>	76, 78
exaltata.....	275	Sapotaceae.....	69
filifolia.....	275	Sapote.....	82
impressa.....	275	Sapotillier.....	79
loricata.....	275	Sapuyul.....	83, 84
salzmanni.....	281	Saugetia.....	878
stolonifera.....	356, 357	fasciculata.....	878
triflora.....	276	Saxigena (section).....	20, 48, 50
<i>Roupala darienensis</i>	228, 229, 230	<i>Schizachyrium brevifolium</i>	279
gardneri.....	223, 230	<i>condensatum</i>	280
dentata.....	230	<i>cubense</i>	280
glaberrima.....	229	<i>domingense</i>	281
loranthoides.....	229	<i>gracile</i>	280
nitida.....	223	<i>hirtiflorus</i>	281
panamensis.....	229	<i>malacostachyum</i>	279
Rousseau, H. H., species named in honor....	176	<i>multinervosum</i>	280
Rubber plantation.....	70	<i>semiberbe</i>	282
scrap.....	71	<i>tenerum</i>	281
tree.....	70, 72	<i>Schizolobium covilleianum</i>	231, 233
Rubiaceae.....	87, 124	<i>excelsum</i>	232, 233
<i>Rustia ferruginea</i>	142	<i>kellermanii</i>	232
<i>Rynchosia calycosa</i>	108	<i>Schoenus paradoxus</i>	88
<i>Rynchospora</i>	87	<i>Schultesia petraea</i>	374
argentea.....	87	Scleria.....	87
Rytilix.....	276	<i>hitchcockii</i>	88
<i>glandulosa</i>	276	Scleropoa.....	396
<i>granularis</i>	276	<i>rigida</i>	396
Sacasebo.....	308	Scotch grass.....	328
Saccharum.....	273, 386	Scrap rubber.....	71
<i>antillarum</i>	353	Scutachne.....	341
<i>bicorne</i>	283	<i>amphistemon</i>	341
<i>caudatum</i>	273	<i>dura</i>	341
<i>cayennense</i>	273	Seaside oats.....	393
<i>contractum</i>	273	Sencuya.....	31
<i>jamaicense</i>	274	Senites.....	392
<i>officinarum</i>	273	<i>haitiensis</i>	392
<i>polystachyum</i>	232, 321	<i>zeugites</i>	392
<i>sagittatum</i>	386	<i>Setaria antillarum</i>	354
<i>violaceum</i>	273	<i>berteroniana</i>	351
<i>Sacciolepis</i>	339	<i>biconvexa</i>	350
<i>gibba</i>	339	<i>brachiata</i>	349
<i>myuros</i>	340	<i>caudata</i>	349
<i>striata</i>	339	<i>elongata</i>	348
<i>vilvoides</i>	340	<i>flava</i>	351
Saint Augustine grass.....	356	<i>geniculata</i>	350

	Page.		Page.
<i>Setaria glauca</i>	351	<i>Spondias dulcis</i>	76
var. <i>geniculata</i>	351	<i>lutea</i>	76
var. <i>imberbis</i>	351	<i>nigrescens</i>	75
var. <i>penicillata</i>	351	<i>purpurea</i>	76
var. <i>purpurascens</i>	351	<i>Sporobolus</i>	367
<i>hispida</i>	351	<i>affinis</i>	368
<i>italica</i>	352	<i>angustus</i>	370
<i>macrostachya</i>	349	<i>argutus</i>	368
<i>magna</i>	352	<i>atrovirens</i>	369
<i>ocreata</i>	402	<i>bahamensis</i>	369
<i>onurus</i>	349	<i>berteroanus</i>	370
<i>purpurascens</i>	351	<i>brasiliensis</i>	368
<i>scandens</i>	352	<i>cubensis</i>	370
<i>setosa</i> var. <i>caudata</i>	349	<i>domingensis</i>	369
<i>tenacissima</i>	352	<i>indicus</i>	369, 370
<i>ventenatii</i>	351	<i>jacquemontii</i>	369, 370
<i>verticillata</i>	352	<i>lamareckii</i>	369, 370
<i>viridis</i>	352	<i>littoralis</i>	369
<i>vulpiseta</i>	350	<i>muralis</i>	368
Seymour grass	282	<i>purpurascens</i>	370
Sharp-petaled Annonas	14	<i>virginicus</i>	369
<i>Sideroxylum</i>	76	<i>Stachyarrhena</i>	87
<i>sapota</i>	77, 81	<i>heterochroa</i>	133, 142
Signapa	86	<i>penduliflora</i>	142
Silky Annonas	9	<i>Stegosia exaltata</i>	275
Soncolla	31	<i>Stenophyllus</i>	87
Soncoba	31	<i>paradoxus</i>	88
Sorghastrum	286	<i>Stenotaphrum</i>	356
<i>agrostoides</i>	287	<i>americanum</i>	356
<i>francavillanum</i>	287	<i>dimidiatum</i> var. <i>americanum</i>	357
<i>parviflorum</i>	287, 402	<i>glabrum</i> var. <i>americanum</i>	357
<i>setosum</i>	287	<i>sarmentosum</i>	356
<i>stipoides</i>	287	<i>secundatum</i>	356
Sorgho	286	<i>Stipa arguens</i>	288
<i>Sorghum bicorne</i>	283	<i>capillaris</i>	367
<i>brevifolium</i>	279	<i>Stolonifera</i>	324
<i>cubanicus</i>	402	<i>Strephium pulchellum</i>	360
<i>cubense</i>	280	<i>Streptachne cubensis</i>	367
<i>dora</i>	286	<i>domingensis</i>	281
<i>fastigiatum</i>	279	<i>floridana</i>	367
<i>gracile</i>	280	<i>scabra</i>	367
<i>halepense</i>	286	<i>Streptochaeta</i>	364
<i>leucostachyum</i>	283	<i>spicata</i>	364
<i>parviflorum</i>	287	<i>Streptogyne</i>	393
<i>pauciflorum</i>	288	<i>crinita</i>	393
<i>saccharoides</i>	282	<i>Styrax</i>	121
<i>vulgare</i>	286	<i>argenteus</i>	122
<i>zizaniodes</i>	285	<i>bogotensis</i>	122
Sour-grass	282, 292, 318	<i>panamensis</i>	121
Soursop	26, 28	<i>warscewiczii</i>	122
mountain	24	Sudan grass	286
wild	8, 24, 25, 26, 28	Sugar apple	59
Soursops	6, 9	cane	273
<i>Spartina</i>	373	<i>Sulcatae</i> (series)	205, 210, 223
<i>cynosuroides</i>	373	<i>Surbana</i>	328
<i>juncea</i>	373	Sweet vernal grass	364
<i>patens juncea</i>	373	<i>Sweetia panamensis</i>	234
<i>Spermacoce hispida</i>	122	<i>Syllepis polystachya</i>	321
<i>laevis</i>	122	<i>Symplocos chiriquensis</i>	168
<i>latifolia</i>	122	<i>martinicensis</i>	169
<i>spinosa</i>	122	<i>Syntherisma</i>	292
<i>tenella</i>	122	<i>argillacea</i>	296
<i>Sphenopholis</i>	372	<i>argyrostachya</i>	294
<i>obtusata</i>	372	<i>curvinervis</i>	295
<i>Spiciformes</i> (subsection)	252, 253, 254	<i>digitata</i>	293

	Page.		Page.
<i>Syntherisma fimbriata</i>	294	<i>Torrubia microphylla</i>	100
<i>insularis</i>	292	<i>nitida</i>	101
<i>ischaemum</i>	294	<i>noxia</i>	101
<i>leucocoma</i>	295, 296	<i>offersiana</i>	101
<i>longiflora</i>	294	<i>pacurero</i>	101
<i>panicea</i>	295, 296	<i>paraguayensis</i>	101
<i>sanguinalis</i>	293	<i>pernambucensis</i>	101
<i>serotina</i>	294	<i>potosina</i>	99
<i>setosa</i>	293	<i>salicifolia</i>	101
<i>simpsoni</i>	294	<i>schombbergklana</i>	101
<i>villosa</i>	295, 402	<i>suspensa</i>	101
<i>Tachigalia</i>	148	<i>tomentosa</i>	101
<i>Tapirira chagrensis</i>	158	<i>uleana</i>	101
<i>guianensis</i>	158	<i>venosa</i>	101
<i>myriantha</i>	157	<i>Trachynotia juncea</i>	373
<i>Tapogomea axillaris</i>	123	<i>Trachypogon</i>	276
<i>tomentosa</i>	123	<i>filifolius</i>	277
<i>Tardavel</i>	122	<i>gouini</i>	277
<i>laevis</i>	122	<i>plumosus</i>	277
<i>latifolia</i>	122	<i>polymorphus</i> var. <i>filifolius</i>	277
<i>ocymoides</i>	122	var. <i>plumosus</i>	277
<i>spinosa</i>	122	<i>Tragus berteronianus</i>	289
<i>tenella</i>	122	<i>Triaena juncea</i>	379
<i>Tejocote</i>	47	<i>Triathera americana</i>	380
<i>Tenera</i>	325, 326	<i>juncea</i>	379, 380
<i>Terminalia</i>	239	<i>Trichachne insularis</i>	292
<i>bucceras</i>	239	<i>Trichochloa berteroniana</i>	290
<i>chiriquensis</i>	238	<i>Tricholaena</i>	346
<i>excelsa</i>	239	<i>insularis</i>	292
<i>hayesii</i>	239	<i>rosea</i>	346
<i>obovata</i>	239	<i>saccharoides</i>	321
<i>Ternaria</i> (section)	250	<i>Tricuspis simplex</i>	381
<i>Tetragonae</i> (series)	205, 222	<i>Tripogon</i>	381
<i>Themeda</i>	288	<i>spicatus</i>	381
<i>arguens</i>	288	<i>Tripsacae</i>	264, 265
<i>ciliata</i>	288	<i>Tripsacum</i>	272
<i>quadrivalvis</i>	288	<i>dactyloides</i>	272
<i>Thrasya</i>	296	<i>hermaphroditum</i>	289
<i>hirsuta</i>	297	<i>monostachyum</i>	272
<i>paspaloides</i>	296, 297	<i>Triscenia</i>	290
<i>robusta</i>	297	<i>ovina</i>	290
<i>Thysanachne peruviana</i>	290	<i>Trisetum</i>	371
<i>Tibisi</i>	335, 357, 397	<i>luteum</i>	401
<i>Timothy</i>	367	<i>spicatum</i>	371
<i>Toreta</i>	31	<i>toluccense</i>	371
<i>Torrubia arcolata</i>	100	<i>Tsapas sabani</i>	82
<i>boliviana</i>	100	<i>Tul-ul</i>	82
<i>cafferiana</i>	100	<i>Turkeys, wild</i>	81
<i>campestris</i>	100	<i>Typhalaea</i> (subgenus)	115
<i>combretiflora</i>	100	<i>Tzapotl</i>	78, 82
<i>coriifolia</i>	100	<i>Tzap-ullul</i>	84
<i>costaricana</i>	99	<i>Tzicozapotl</i>	78, 79
<i>cuspidata</i>	100	<i>Ulocarpus</i> (section)	9, 11
<i>domingensis</i>	100	<i>Uniola</i>	393
<i>dussii</i>	99	<i>maritima</i>	394
<i>eggersiana</i>	100	<i>paniculata</i>	393
<i>ferruginea</i>	100	<i>racemiflora</i>	393, 394
<i>fragrans</i>	99, 100	<i>sparta</i>	393
<i>graciliflora</i>	100	<i>spicata</i>	394
<i>harrisiana</i>	100	<i>virgata</i>	393
<i>hassleriana</i>	100	<i>Uva grass</i>	386
<i>hirsuta</i>	100	<i>Uvaria sessilis</i>	67
<i>laxiflora</i>	100	<i>Valota</i>	291
<i>ligustrifolia</i>	100	<i>eggersii</i>	292
<i>linearibracteata</i>	99, 100	<i>insularis</i>	292
<i>luteovirens</i>	100	<i>laxa</i>	292

	Page.		Page.
Velvet grass.....	371	Water apple.....	14, 15
Vetiver.....	285	Water-grass.....	318
<i>Vetiveria arundinacea</i>	285	Wercklea.....	112
<i>muricata</i>	285	<i>insignis</i>	112
<i>zizanioides</i>	285	West Indian flora, bibliography.....	261
<i>Vilfa affinis</i>	369	collections.....	263
<i>arguta</i>	368	Wild cane.....	386
<i>atrovirens</i>	369	oats.....	361
<i>berteroana</i>	370	soursop.....	8, 24, 25, 26, 28
<i>cruciata</i>	375	turkeys.....	81
<i>domingensis</i>	369	Wiregrass.....	312
<i>grisebachiana</i>	370	Ya.....	79
<i>indica</i>	370	Zapoto.....	77, 78, 79, 82, 83, 85
<i>intermedia</i>	402	amarillo.....	86
<i>jacquemontii</i>	370	borracho.....	86
<i>purpurascens</i>	370	chico.....	76, 78, 79
<i>richardi</i>	368	grande.....	78
<i>virginica</i>	369	gum.....	78, 84
Virgata.....	325	mamey.....	82
Virola.....	144	resin.....	84
<i>carinata</i>	144	seed.....	83
<i>panamensis</i>	144	tree.....	77, 83
<i>venosa</i>	144	wood.....	83
<i>warburgii</i>	148	Zapotillo.....	78, 86
<i>Vitellaria</i>	76	calenturiente.....	85
<i>mammosa</i>	81	Zapotte.....	82
<i>Vitex divaricata</i>	171	à crème.....	82
<i>floridula</i>	170, 171	grosse.....	82
<i>masoniana</i>	170	<i>Zeugites americana</i>	392
<i>multiflora</i>	170	<i>haticensis</i>	392
<i>Vochysia ferruginea</i>	237, 238	<i>jamaicensis</i>	392
<i>tomentosa</i>	237	<i>Zoisia rigida</i>	289
Vulpinae (series).....	193, 201, 222	Zuelania crenata.....	164
Waltheria glomerata.....	117	<i>laetioides</i>	164
<i>involucrata</i>	117	<i>roussoviae</i>	163
<i>subcordata</i>	117		

INDEX.

[Synonyms in *italic*. Page numbers of principal entries in heavy-face type.]

	Page.		Page.
Achlaena	290, 291	Andropogon annulatus	282
<i>piptostachya</i>	291	<i>var. subrepens</i>	281
Agrosticula muralis	368	<i>arundinaceus</i>	286
Agrostideae	285, 269	<i>avenaceus</i>	286
Agrostis	371	<i>barbatus</i>	377
<i>alba</i>	371	<i>bicornis</i>	283
<i>berteriana</i>	290	<i>brevifolius</i>	279
<i>brasilensis</i>	302	<i>caricosus</i>	281
<i>complanata</i>	374, 375	<i>condensatus</i>	280, 401
<i>cruciata</i>	375	<i>contortus</i>	287
<i>domingensis</i>	369	<i>cubensis</i>	280
<i>indica</i>	369	<i>densus</i>	284
<i>jamaicensis</i>	295	<i>domingensis</i> Hubbard.....	281
<i>littoralis</i>	369, 371	<i>domingensis</i> Spreng.....	287
<i>monostachya</i>	340	<i>domingensis</i> Steud.....	283
<i>perennans</i>	371	<i>fastigiatus</i>	279
<i>purpurascens</i>	370	<i>francavillanus</i>	287
<i>pyramidalis</i>	368	<i>glomeratus</i>	284
<i>pyramidata</i>	368	<i>gracilis</i>	280
<i>radiata</i>	375	<i>halapensis</i>	286
<i>rigidifolia</i>	342	<i>hirtiflorus</i>	281
<i>tenuissima</i>	370	<i>hirtus</i>	284
<i>virginica</i>	369	<i>imberbis</i> <i>var. muticus</i>	281
Agrostoides	325	<i>inermis</i>	280
Aira brasiliensis	368	<i>insularis</i>	292
<i>gigantea</i>	401	<i>ischaemum</i>	282
<i>laza</i>	393	<i>juncifolius</i>	280
<i>obtusata</i>	372	<i>latifolius</i>	274
<i>spicata</i>	371	<i>leucopogon</i>	283
Alectoridia quartiniana	277	<i>leucostachyus</i>	283
Alloteropsis amphistemon	341	<i>var. selleanus</i>	283
<i>dura</i>	341	<i>macrourus</i>	284
Alopecurus monspeliensis	371	<i>malacostachyus</i>	279
Amor seco	352	<i>microstachyus</i>	280
Amphilophis ischaemum	282	<i>multinervosus</i>	280
<i>piptatherus</i>	282	<i>muricatus</i>	285
<i>saccharoides</i>	283	<i>nardus</i>	285
Anastrophus compressus	300	<i>nashianus</i>	284
Anatherum	285	<i>nodosus</i>	281
<i>berterianum</i>	401	<i>obtusifolius</i>	279
<i>bicorne</i>	283	<i>oligostachyus</i>	281
<i>caudatum</i>	273	<i>panormitanus</i>	282
<i>domingense</i>	283	<i>pertusus</i>	282
<i>inermis</i>	280, 281	<i>var. panormitanus</i>	282
<i>macrourum</i>	284	<i>piptatherus</i>	282
<i>muricatum</i>	285	<i>polydactylon</i>	377
<i>pedunculatum</i>	401	<i>quadrivalvis</i>	288
<i>portoricense</i>	273	<i>saccharoides</i>	282
<i>spathiflorum</i>	280, 281	<i>subsp. leucopogon subvar. paucitra-</i>	
<i>virgatum</i>	280	<i>meus</i>	282, 283
<i>rhizanioides</i>	285	<i>var. surius</i>	283
Andropogon	277	<i>salzmanni</i>	281
<i>agrostoides</i>	287	<i>scoparius</i>	280

	Page.		Page.
<i>Andropogon secundus</i>	287	<i>Arthrostylidium multispicatum</i>	399
<i>selloanus</i>	283	<i>obtusatum</i>	400
<i>semiberbis</i>	282	<i>prestoel</i>	398
var. <i>incertus</i>	281	<i>pubescens</i>	399
<i>setosus</i>	287, 402	<i>sarmentosum</i>	398
<i>sorghum</i>	286	<i>urbanii</i>	398
<i>sudanensis</i>	286	<i>Arundinaria capillifolia</i>	397
<i>spathiflorus</i>	280	<i>cubensis</i>	399
<i>squarrosus</i>	285	<i>excelsa</i>	399
<i>stipoides</i>	287	<i>microclada</i>	400
<i>tener</i>	281	<i>multispicata</i>	399
<i>tenuispathus</i>	284	<i>obtusata</i>	400
<i>urbanianus</i>	284	<i>pubescens</i>	399
<i>virgatus</i>	280	<i>urbanii</i>	398
<i>virginicus</i>	284	<i>Arundinella</i>	289
<i>wrightii</i>	288	<i>berteroniana</i>	290
<i>zizanioides</i>	285	<i>confinis</i>	290
<i>Andropogoneae</i>	284, 265	<i>cubensis</i>	290
<i>Angustifolia</i>	323	<i>deppeana</i>	290
<i>Anthaenantia lanata</i>	291	<i>martinicensis</i>	290
<i>Anthephora</i>	288	<i>peruviana</i>	290
<i>elegans</i>	289	<i>Arundo</i>	386
<i>hermaphrodita</i>	289	<i>donax</i>	386, 402
<i>villosa</i>	289	<i>occidentalis</i>	386
<i>Anthistiria ciliata</i>	288	<i>phragmites</i>	385
<i>Anthoxanthum</i>	364	<i>saccharoides</i>	386
<i>odoratum</i>	364	<i>sagittata</i>	386
<i>Apluda zeugites</i>	392	<i>Atheropogon domingensis</i>	379
<i>Arana</i>	393	<i>Atropis carinata</i>	383
<i>Aristida</i>	364	<i>Avena</i>	372
<i>adscensionis</i>	365	<i>fatua</i>	372
var. <i>americana</i>	380	<i>lutea</i>	401
<i>americana</i>	380	<i>sativa</i>	372
<i>antillarum</i>	380	<i>Aveneae</i>	265, 269
<i>bromoides</i>	365	<i>Axonopus</i>	299
<i>cognata</i>	365	<i>appendiculatus</i>	300
<i>curtifolia</i>	365	<i>aureus</i>	300
<i>dispersa</i>	365	<i>capillaris</i>	300
<i>domingensis</i>	281	<i>compressus</i>	300, 402
<i>erecta</i>	366	<i>digitatus</i>	293
<i>geminata</i>	377	<i>equitans</i>	301
<i>gyrans</i>	366	<i>macrostachyus</i>	301
<i>humilis</i>	365	<i>panicus</i>	295
<i>maritima</i>	365	<i>pellitus</i>	301
<i>portoricensis</i>	366	<i>Bahama grass</i>	373
<i>purpurascens</i>	365	<i>Bamboo</i>	397, 401
<i>refracta</i>	366	<i>Bambos</i>	401
<i>scabra</i>	367	<i>latifolia</i>	401
<i>secunda</i>	379	<i>nana</i>	401
<i>spiciformis</i>	366	<i>vulgaris</i>	401
<i>stricta</i>	365	<i>Bamboseae</i>	264, 271, 272, 397
<i>subbiflora</i>	380	<i>Bambusa sieberi</i>	401
<i>swartziana</i>	365	<i>Barba de indio</i>	277, 292, 374
<i>Arroz</i>	362	<i>Bermuda grass</i>	373
<i>Arthraxon</i>	277	<i>Biatherium oliosum</i>	377
<i>ciliaris</i> subsp. <i>quartinianus</i>	277	<i>Blue grass, annual</i>	395
<i>quartinianus</i>	277	<i>Canada</i>	395
<i>Arthropogon</i>	291	<i>Bouteloua</i>	379, 380
<i>stipitatus</i>	291	<i>americana</i> Pilger.....	380
<i>Arthrostylidium</i>	379, 397	<i>americana</i> Scribn.....	380
<i>angustifolium</i>	400	<i>disticha</i>	381
<i>capillifolium</i>	379, 397	<i>elatio</i>	380
<i>cubense</i>	399	<i>heterostega</i>	381
<i>distichum</i>	398	<i>humboldtiana</i>	381
<i>excelsum</i>	399	<i>junceae</i>	379
<i>fimbriatum</i>	398	<i>litigiosa</i>	380
<i>haitiense</i>	399	<i>porphyrantha</i>	381

	Page.		Page.
<i>Bouteloua triana</i>	380	<i>Chaetochloa glauca</i>	351
<i>vanederi</i>	379	<i>hispida</i>	351
<i>Brachiaria</i>	299	<i>imberbis</i>	351
<i>erucaeformis</i>	299	<i>geniculata</i>	351
<i>plantaginea</i>	299	<i>impressa</i>	350
<i>platyphylla</i>	299	<i>italica</i>	352
<i>Briza</i>	394	<i>lutescens</i>	351
<i>maxima</i>	394	<i>magna</i>	352
<i>minor</i>	394	<i>onurus</i>	349
<i>Bromus</i>	396	<i>palmifolia</i>	348
<i>spicatus</i>	381	<i>purpurascens</i>	351
<i>sterilis</i>	396	<i>rariflora</i>	349
<i>unioloides</i>	396	<i>salzmanniana</i>	350
<i>virgatus</i>	384	<i>scandens</i>	352
<i>Burgrass</i>	331, 354	<i>setosa</i>	348, 349, 350
<i>Cabrera</i> (section of <i>Axonopus</i>)	299	<i>sulcata</i>	348
<i>Caguazo</i>	319	<i>tenacissima</i>	352
<i>Camalote</i>	357	<i>ventenatii</i>	351
<i>Camandula</i>	272	<i>verticillata</i>	352
<i>Cambute</i>	357	<i>viridis</i>	352
<i>Caña brava</i>	401	<i>vulpiseta</i>	350
<i>Caña de azúcar</i>	273	<i>Chamaeraphis parvigluma</i>	353
<i>Cañamazo</i>	318	<i>Chlorideae</i>	265, 270
<i>amargo</i>	357	<i>Chloris</i>	374
<i>de sabana</i>	301	<i>aristata</i>	377
<i>dulce</i>	300, 301	<i>bahiensis</i>	375
<i>hembro</i>	318	<i>barbata</i> Nash	377
<i>macho</i>	301	<i>barbata</i> Swartz	376
<i>Canary grass</i>	364	<i>brevigluma</i>	375
<i>Cane, wild</i>	386	<i>caribaea</i>	375
<i>Cañuela</i>	286	<i>ciliata</i>	376
<i>Capillaria</i>	324	<i>cruciata</i>	375
<i>Carpet grass</i>	300	<i>elegans</i>	376
<i>Caryochloa bahiensis</i>	362	<i>eleusinoidea</i>	375
<i>Capriola</i>	373	<i>vestita</i>	375
<i>dactylon</i>	373	<i>foliosa</i>	377
<i>Cenchropsis myosuroides</i>	355	<i>glaucescens</i>	376
<i>Cenchrus</i>	354	<i>humboldtiana</i>	375
<i>brevisetus</i>	356	<i>leptantha</i>	375
<i>carolinianus</i>	355, 356	<i>orthonoton</i>	376
<i>ciliaris</i>	354	<i>paraguayensis</i>	376
<i>distichophyllus</i>	355	<i>penicillata</i>	376
<i>echinatus</i>	356	<i>petraea</i>	374
<i>forma longispina</i>	355	<i>polydactyla</i>	377
<i>var. viridis</i>	356	<i>propinqua</i>	376
<i>elliottii</i>	355	<i>radiata</i>	375
<i>gracillimus</i>	356	<i>sagraeana</i>	375
<i>granularis</i>	276	<i>septentrionalis</i>	374, 375
<i>hirsutus</i>	401	<i>swartziana</i>	374
<i>insularis</i>	356	<i>swartzii</i>	374
<i>laevigatus</i>	289	<i>virgata</i>	376
<i>macrocephalus</i>	355	<i>Chondrachyum scabrum</i>	401
<i>microcephalus</i>	356	<i>Christmas grass</i>	288
<i>myosuroides</i>	355	<i>Christ's tears</i>	272
<i>parviflorus</i>	401	<i>Chrysopogon</i>	288
<i>setosus</i>	354	<i>pauciflorus</i>	288
<i>tribuloides</i>	355	<i>Chusquea</i>	400
<i>var. macrocephalus</i>	355	<i>abietifolia</i>	400
<i>viridis</i>	356	<i>Cinna glomerata</i>	284
<i>Ceresia fluitans</i>	307	<i>Citronella grass</i>	285
<i>Chaetaria antillarum</i>	380	<i>Cockroach grass</i>	285
<i>Chaetium</i>	346	<i>Coelorachis impressa</i>	275
<i>cubanum</i>	346	<i>loricata</i>	275
<i>Chaetochloa</i>	346	<i>Coix</i>	272
<i>barbata</i>	348	<i>dactylodes</i>	272
<i>corrugata parviflora</i>	401	<i>lacryma-jobi</i>	272
<i>geniculata</i>	350, 351, 401	<i>Cornucoplae perennans</i>	371

	Page.		Page.
Cortaderia.....	402	Eragrostis.....	387
Cortedero.....	319	acutiflora.....	391
Crabgrass.....	293, 294	airoides.....	388
Crowfoot grass.....	382	amabilis.....	388
Cymbopogon.....	284	arabica.....	388
citratus.....	285	bahamensis.....	390, 391
hirtus.....	284	bahiensis.....	391
nardus.....	285	barrelieri.....	390
Cynodon dactylon.....	373	berteroniana.....	391
Cynosurus aegyptius.....	382	cilianensis.....	390
domingensis.....	384	ciliaris.....	388
indicus.....	381	brachystachya.....	388
virgatus.....	383	laxa.....	388
Dactylis.....	394	conferta.....	390
glomerata.....	395	cubensis.....	391
Dactyloctenium.....	382	delicatula.....	389
aegyptium.....	382	domingensis.....	392
meridionale.....	382	elliottii.....	391
Danthonia.....	372	eragrostis.....	390
domingensis.....	373	excelsa.....	392
shrevei.....	373	gigantea.....	392
Devil's grass.....	373	glomerata.....	390
Dichanthelium (subgenus of Panicum)....	322, 331	glutinosa.....	390
Dichanthium nodosum.....	281	hypnoides.....	389
Dichotoma.....	322	leonina.....	388
Dichotomiflora.....	324, 325	macropoda.....	391
Diectomis fastigiata.....	279	major.....	390
Diffusa.....	327	megastachya.....	390
Digitaria domingensis.....	300, 401	pilosa.....	389
fimbriata.....	294	plumosa.....	388
foliosa.....	307	poeaeoides.....	389
horizontalis.....	293	prolifera.....	391, 392
insularis.....	292	purpurascens.....	391, 392
jamaicensis.....	293	purshii.....	389
leucophaea.....	292	refracta.....	391
longiflora.....	294	reptans.....	389
marginata.....	294	sudans.....	390
platycaulis.....	300	tephrosanthos.....	389
pulchella.....	360	Erianthus.....	274
repens.....	402	jamaicensis.....	274
sanguinalis.....	293	ravennae.....	274
serotina.....	294	var. jamaicensis.....	274
setigera.....	293	saccharoides.....	274
setosa.....	293	Eriochloa.....	298
Dimorphostachys pedunculata.....	316	annulata.....	298
Diplachne carinata.....	383	filifolia.....	298
tarapacana.....	383	punctata.....	298
verticillata.....	383	var. subglabra.....	299
Distichlis.....	394	ramosa.....	298
maritima.....	394	subglabra.....	299, 328
spicata.....	394	Eriochrysis.....	273
Donax arundinaceus.....	386	cayennensis.....	273
Dutch grass.....	328	Espartillo.....	370
Eatonia obtusata.....	372	Eustachys petraea.....	374
Echinochloa.....	345	(section of Chloris).....	374
colonum.....	345	Eutriana antillarum.....	380
crusgalli.....	345, 346	heterostega.....	381
cubensis.....	402	juncea.....	379
pyramidalis.....	345	ledebouri.....	379, 380
sabulicola.....	345	Fasciculata.....	324
spectabilis.....	346	Fescue, meadow.....	395
walteri.....	345	Festuca.....	395
Eleusine.....	381	bromoides.....	395
indica.....	381	elatior.....	395
mucronata.....	382, 383	fascicularis.....	383
procera.....	393	filiformis.....	382
virgata.....	384	fournieriana.....	384

	Page.		Page.
<i>Festuca laxiflora</i>	384	<i>Hymenachne myurus</i>	340
<i>myuros</i>	395	<i>patula</i>	340, 341
<i>phleoides</i>	372	<i>striata</i>	339
<i>polystachya</i>	383	<i>Hypogynium spathiflorum</i>	280, 281
<i>thouini</i>	402	<i>Ichnanthus</i>	333
Festuceae.....	265, 270	<i>axillaris</i>	334
Foxtail.....	277	<i>lechnodes</i>	335
green.....	352	<i>lelocarpus</i>	334
yellow.....	352	<i>mayarensis</i>	333
Gama grass.....	272	<i>nemoralis</i>	334
Gamalote.....	348	<i>nemorosus</i>	334
Giant reed.....	386	<i>pallens</i>	334
Ginger grass.....	331	<i>petiolatus</i>	335
Goosegrass.....	381	<i>tenuis</i>	334
Gouinia.....	384	<i>wrightii</i>	333
<i>polygama</i>	384	Ilusión.....	330, 389
<i>virgata</i>	384	Imperata.....	272, 401
Grama.....	373	<i>brasiliensis</i>	273
<i>de caballo</i>	382	<i>caudata</i>	273, 321, 350
<i>pintada</i>	345	<i>contracta</i>	273, 350
Gramón de costa.....	357	Isachne.....	341
<i>Guadua latifolia</i>	401	<i>angustifolia</i>	343
Güín.....	386	<i>arundinacea</i>	343, 402
Guinea cimarrona.....	363	<i>disperma</i>	343
corn.....	286	<i>dubia</i>	343
grass.....	329	<i>leersoides</i>	342
Guisasillo.....	351	<i>panicea</i>	343
Guizazo.....	354	<i>polygonoides</i>	343
Gymnopogon.....	377	<i>pygmaea</i>	342
<i>filiformis</i>	377	<i>rigens</i>	342
<i>foliosus</i>	377	<i>rigidifolia</i>	342
<i>laevis</i>	377	<i>trachysperma</i>	343
<i>spicatus</i>	377	<i>Ischaemopogon latifolius</i>	274
<i>Gymnothrix domingensis</i>	353	Ischaemum.....	274
Gynerium.....	385, 386	<i>angustifolium</i>	274
<i>saccharoides</i>	386	<i>latifolium</i>	274
<i>sagittatum</i>	386	<i>rugosum</i>	274
<i>Hackelochloa granularis</i>	276	<i>secundatum</i>	356
<i>Helopus punctatus</i>	298	Job's tears.....	272
Heteropogon.....	287	Johnson grass.....	286
<i>contortus</i>	287	Kangaroo grass.....	288
<i>Heterosteca juncifolia</i>	381	Khas-khas.....	285
<i>rhadina</i>	381	Khus-khus.....	285
Hierba bruja.....	328	Koeleria.....	372
<i>de Don Carlos</i>	286	<i>phleoides</i>	372
<i>de limón</i>	285	Lagrimas de Job.....	272
<i>del Paral</i>	328	Lancearia.....	323
Holcus.....	286	<i>Lappago aliena</i>	289
<i>cubanicus</i>	402	Lasiacis.....	335
<i>halepensis</i>	286	<i>compacta</i>	339
<i>lanatus</i>	371	<i>divaricata</i>	336, 337
<i>pertusus</i>	282	<i>grisebachii</i>	336
<i>saccharoides</i>	283	<i>harrisii</i>	336
<i>sorghum</i>	286	<i>ligulata</i>	337
<i>sudanensis</i>	286	<i>oaxacensis</i>	336
<i>striatus</i>	339	<i>patentiflora</i>	338
Homalocenchrus.....	362	<i>ruscifolia</i>	339
<i>grandiflorus</i>	363	<i>sloanei</i>	337, 338
<i>hexandrus</i>	363	<i>sorghoidea</i>	337, 338
<i>monandrus</i>	363	<i>swartziana</i>	338
Hordeae.....	264, 271	Laxa.....	325
Hordeum.....	396	Laxiflora.....	322
<i>pusillum</i>	396	<i>Leersia aspera</i>	363
Hymenachne.....	340	<i>hexandra</i>	363
<i>amplexicaulis</i>	340, 341	<i>monandra</i>	363
<i>auriculata</i>	340	Lemon grass.....	285
<i>auriculata</i>	340	Leptochloa.....	382

	Page.		Page.
<i>Leptochloa brachiata</i>	383	<i>Mniochloa pulchella</i>	360
<i>domingensis</i>	384	<i>strephioides</i>	360
<i>fascicularis</i>	383	<i>Moenchia speciosa</i>	321, 322
<i>filiformis</i>	382	<i>Monachne punctata</i>	298
<i>imbricata</i>	383	<i>subglabra</i>	299
<i>longa</i>	384	<i>Monanthochloë</i>	385
<i>mucronata</i>	383	<i>littoralis</i>	385
var. <i>multiflora</i>	383	<i>Muhlenbergia</i>	367
<i>nealleyi</i>	383	<i>berteroniana</i>	290
<i>perennis</i>	384	<i>capillaris</i>	367
<i>scabra</i>	383	<i>spicata</i>	378
<i>spicata</i>	381	Natal grass.....	346
<i>stricta</i>	383	<i>Navicularia lanata</i>	334
<i>uninervia</i>	383	Nazia.....	289
<i>virgata</i>	383	<i>aliena</i>	289
var. <i>domingensis</i>	384	Nazieae.....	264, 266
var. <i>gracilis</i>	384	Notholcus.....	371
<i>virletii</i>	383	<i>lanatus</i>	371
<i>Leptocoryphium</i>	291	Oat, cultivated.....	372
<i>lanatum</i>	291	<i>wild.</i>	372
<i>Leptostachys virgata</i>	384	Oats, seaside.....	393
<i>Leptothrium</i>	289	<i>wild.</i>	361
<i>rigidum</i>	289	<i>Oedipachne punctata</i>	298
<i>Lithachne</i>	358	<i>Olyra</i>	357
<i>axillaris</i>	358	<i>arundinacea</i>	357
<i>pauciflora</i>	358	<i>axillaris</i>	358
<i>pineti</i>	358	<i>ciliatifolia</i>	358
<i>Lolium</i>	396	<i>latifolia</i>	335, 357, 358
<i>multiflorum</i>	396	var. <i>arundinacea</i>	357
<i>temulentum arvense</i>	396	<i>nana</i>	360
<i>Luziola</i>	361	<i>paniculata</i>	357
<i>alabamensis</i>	362	<i>pauciflora</i>	358
<i>bahiensis</i>	361, 362	<i>pineti</i>	358
<i>longivalvula</i>	362	<i>semiovata</i>	358
<i>peruviana</i>	361	<i>strephioides</i>	360
<i>spruceana</i>	362	<i>Opizia</i>	384
<i>Malojilla</i>	299, 328	<i>stolonifera</i>	385
<i>Manisuris</i>	275	<i>Oplismenus</i>	343
<i>aurita</i>	276	<i>burmanni</i>	344
<i>exaltata</i>	275	<i>cristatus</i>	344
<i>granularis</i>	276	<i>cubensis</i>	344
<i>impressa</i>	275	<i>hirtellus</i>	344, 402
<i>leonina</i>	275	<i>jamaicensis</i>	345
<i>loricata</i>	275	<i>loliaceus</i>	344
<i>Mary grass</i>	348	<i>setarius</i>	334, 344
<i>Meadow fescue</i>	395	<i>tenuis</i>	334
<i>Megastachya berteroniana</i>	391	<i>undulatifolius</i>	344
<i>uninervia</i>	383	Orchard grass.....	395
<i>Melinideae</i>	264, 266	<i>Orthoclada</i>	393
<i>Mesosetum</i>	297	<i>laxa</i>	393
<i>loliiforme</i>	298	<i>rariflora</i>	393
<i>wrightii</i>	298	<i>Orthopogon cubensis</i>	344
<i>Milium compressum</i>	300	<i>hirtellus</i>	344
<i>digitatum</i>	293	<i>loliaceus</i>	344
<i>lanatum</i>	291	<i>setarius</i>	344
<i>nemorosum</i>	334	<i>Oryza</i>	362
<i>panicum</i>	295	<i>hexandra</i>	363
<i>punctatum</i>	298	<i>latifolia</i>	362
<i>ramosum</i>	298	<i>monandra</i>	363
<i>rigidifolium</i>	342	<i>grandiflora</i>	363
<i>rigidum</i>	342	<i>sativa</i>	362
<i>villosum</i>	292	<i>latifolia</i>	362
<i>Millet</i>	352	<i>Oryzeae</i>	264, 269
<i>broomcorn</i>	328	<i>Orydenia virgata</i>	384
<i>hog</i>	328	<i>Pachol</i>	285
<i>Millo</i>	286	<i>Pachuli</i>	285
<i>Mniochloa</i>	360		

	Page.
Panicatae.....	264
Paniceae.....	264, 267
Panicum.....	322, 333
aciculare.....	331
acuminatum.....	332
albomarginatum.....	332
alsinoides.....	334
altum.....	329
amarulum.....	329
amphibolum.....	350
amphistemon.....	341
amplexicaule.....	340
amplifolium.....	350
antillarum.....	353
aquaticum Bosc.....	339
aquaticum Poir.....	328
arenicoloides.....	331
argyrostachyum.....	294
aristatum.....	345
arundinaceum.....	343
auriculatum.....	340
artillare.....	334
bambusoides.....	336, 337
barbatum.....	348
barbinode.....	327
berteronianum.....	351
boliviense.....	330
brachiatum.....	348, 349
burmanni.....	344
caerulescens.....	332
caricoides.....	329
carthaginense.....	328
caudatum.....	348
cenchroides.....	355
chamaelonche.....	332
chapmani.....	327
chauvintii.....	337
chrysites.....	300
chrysopsidifolium.....	331
colonum.....	345
compactum.....	339
condensum.....	329
confertum.....	402
costatum.....	348
cubense.....	344
curvinerve.....	295
cyanescens.....	330
dactylon.....	373
decumbens.....	316
diffusum.....	329
dispermum.....	343
dissectum.....	306
distantiflorum.....	327
divaricatum.....	336
puberulum.....	337
stenostachyum.....	337
domingense.....	295, 401, 402
duchaissingii.....	292
dumetorum.....	349
durum.....	341
eggersii.....	292
elliottianum.....	339
erectifolium.....	332
erucaeforme.....	299
exiguiflorum.....	330
falsum.....	292
fasciculatum.....	348

	Page.
<i>Panicum flavescens</i>	348
frondescens.....	330
fruticosum.....	337
fusciflorum.....	291
fusiforme.....	331
geminatum.....	327
geniculatum.....	350
ghiesbreghtii.....	329
gibbum.....	339, 340
glaucum.....	351
glutinosum.....	331, 337
grande.....	333
grisebachii.....	336
hamiltonii.....	293
hirsutum.....	329
hirtellum.....	344
hirtum.....	333
horizontale.....	293
hymenachne.....	340
ichnodes.....	335
imberbe.....	351
impressum.....	350
ineptum.....	331
insulare.....	292
ischaemum.....	294
jamaicense.....	345
joorii.....	332
lagotes.....	335
lanatum.....	292, 338, 339
sorghoideum.....	338
lancearium.....	332
latifolium.....	337, 338
laxum.....	330
leiocarpon.....	334
leptochyrium.....	353
leucophaeum.....	292
leucothrix.....	332
loliiforme.....	298
longiflorum.....	294
lutescens.....	351
martinianum.....	334
martinicense.....	338, 339
maximum.....	329
mayarense.....	333
megiston.....	331
milleflorum.....	330
millegrana.....	331
monobotrys.....	321
monostachyum.....	311, 321
multinerve.....	343
multirameum.....	332
myosurus.....	340
myuros.....	340
nemorale.....	334
nemorosum.....	334
neuranthum.....	331
nitidum.....	331
oaxacense.....	336
ocreatum.....	402
onurus.....	348, 349, 350
oxyanthum.....	302
pallens.....	334
palmaefolium.....	348
palmifolium.....	348
paniculatum.....	317
paractenioides.....	349
parvifolium.....	330

	Page.		Page.
<i>Panicum penicillatum</i>	351	Pará grass.....	327
<i>petiolatum</i>	335	Paraná.....	328
<i>phleiforme</i>	340	Paratheria.....	353
<i>pilosum</i>	330	<i>prostrata</i>	353
<i>plicatum</i>	348	Pariana sylvestris.....	396
var. <i>haitiense</i>	348	Parvifolia.....	326
<i>polycaulon</i>	331	Paspalum.....	302
<i>polygonatum</i>	330	<i>alterniflorum</i>	312
<i>polygonoides</i>	343	<i>angustifolium</i>	311
<i>polystachyum</i>	340	<i>antillense</i>	309, 310
<i>portoricense</i>	332	<i>appendiculatum</i>	300
<i>praegnans</i>	337	<i>bakeri</i>	315
<i>pulchellum</i>	330	<i>boscianum</i>	310, 311
<i>pyramidale</i>	345	<i>brachiatum</i>	307, 308
<i>rariflorum</i>	393	<i>breve</i>	314
<i>repens</i>	329	<i>caespitosum</i>	314, 317, 402
<i>restitutum</i>	349	<i>capillare</i>	300
<i>rigens</i>	342	<i>capillifolium</i>	313
<i>rigidifolium</i>	342	<i>caudicatum</i>	312
<i>roanokense</i>	332	<i>ciliatifolium</i>	315
<i>rohrlii</i>	402	<i>ciliiferum</i>	316
<i>rudgel</i>	331	<i>clavuliferum</i>	317
<i>rugelii</i>	336	<i>compressum</i>	300
<i>ruscifolium</i>	336, 339	<i>conjugatum</i>	318
<i>sabulicola</i>	345	<i>pubescens</i>	318
<i>saccharoides</i>	292, 321, 322	var. <i>subcordatum</i>	402
<i>sanguinale</i>	293	<i>convexum</i>	311
var. <i>simpsoni</i>	294	<i>coryphaeum</i>	320
<i>schiffneri</i>	330	<i>cubense</i>	263
<i>scoparium</i>	332	<i>debile</i>	316
<i>setarium</i>	344	<i>decumbens</i>	316
<i>setosum</i>	348, 349, 350	<i>densum</i>	320, 402
<i>simpsoni</i>	294	<i>denticulatum</i>	309
<i>sloanei</i>	338	<i>digitatum</i>	293
<i>sorghoideum</i>	338, 339	<i>dilatatum</i>	318
<i>spectabile</i>	346	<i>dissectum</i>	306, 307
var. <i>guadeloupense</i>	345	<i>distachyon</i>	308
<i>sphaerocarpum</i>	350	<i>distichum</i>	308
<i>stenodes</i>	329	<i>vaginatum</i>	307
<i>stenodoides</i>	329	<i>dolichophyllum</i>	312
<i>stevensianum</i>	330	<i>elatum</i>	311
<i>stoloniferum</i>	330	<i>elegans</i>	321
<i>striatum</i>	339	<i>exasperatum</i>	300
<i>strigosum</i>	331	<i>fasciculatum</i>	318
<i>sulcatum</i>	348	<i>filiforme</i>	312
<i>swartzianum</i>	338, 339	<i>filostachyum</i>	300, 301
<i>tenacissimum</i>	352	<i>fimbriatum</i>	311
<i>tenerum</i>	329	<i>fluitans</i>	307
<i>thrasya</i>	296	<i>foliosum</i>	307
<i>trachyspermum</i>	343	<i>glabrum</i>	314, 315, 402
<i>trichanthum</i>	330	<i>gracile</i>	313
<i>trichoides</i>	330	<i>guadeloupense</i>	402
<i>trigonum</i>	331	<i>helleri</i>	314, 315
<i>true</i>	327	<i>hemicryptum</i>	311
<i>unispicatum</i>	321	<i>hemisphericum</i>	316, 317
<i>utowanaeum</i>	327	<i>heterophyllum</i>	314
<i>viaticum</i>	348	<i>heterotrichon</i>	307
<i>vilvoide</i>	340	<i>paucispicatum</i>	307
<i>virgatum cubense</i>	326, 329	<i>inflatum</i>	307
<i>viride</i>	352	<i>koleopodium</i>	402
<i>viscidellum</i>	332	<i>lagascae</i>	402
<i>wrightianum</i>	332	<i>lanatum</i>	291
<i>xalapense</i>	331	<i>lanceae-folium</i>	314
<i>zizanioides</i>	333	<i>lenormandi</i>	317
<i>Pappophorum</i>	385	<i>leoninum</i>	313
<i>alopecuroideum</i>	385	<i>leptocaulon</i>	312
<i>laguroideum</i>	385	<i>leucocheilum</i>	319

	Page.		Page.
<i>Paspalum lindenianum</i>	312	<i>Paspalum undulatum</i>	309, 310
<i>lineare</i> Swartz.....	312	<i>unispicatum</i>	321
<i>lineare</i> Trin.....	312	<i>vaginatum</i>	307, 308
<i>lividum</i>	309	<i>vaginiflorum</i>	316
<i>lloydii</i>	316	<i>virgatum</i>	319
<i>longiflorum</i>	294	var. <i>jacquinianum</i>	319
<i>longifolium</i>	312	var. <i>schreberianum</i>	320
<i>megaphyllum</i>	312	var. <i>stramineum</i>	319
<i>melanospermum</i>	311	<i>wrightii</i>	310
<i>membranaceum</i>	306	<i>Pata de gallina</i>	294, 373, 374, 382
<i>miliare</i>	314	<i>finá</i>	293
<i>milioideum</i>	314	<i>Paurochaetium</i> (subgenus of <i>Panicum</i>)....	322, 327
<i>millegrana</i>	320	<i>Pega-pegá</i>	352
<i>minus</i>	309	<i>Pennisetum</i>	353
<i>minutum</i>	300	<i>aloppecuroides</i>	354
<i>molle</i>	402	<i>americanum</i>	351
<i>multicaule</i>	317	<i>antillarum</i>	353
<i>nanum</i>	312	<i>cenchroides</i>	354
<i>neesii</i>	311	<i>ciliare</i>	354
<i>notatum</i>	309	<i>domingense</i>	353
<i>nutans</i>	316, 402	<i>erubescens</i>	354
<i>olivaceum</i>	310	<i>glaucum</i>	351
<i>orbiculatum</i>	317, 402	<i>hamiltonii</i>	354
<i>paniculatum</i>	316, 402	<i>orientale triflorum</i>	354
<i>minor</i>	317	<i>pungens</i>	355
<i>panicum</i>	402	<i>setosum</i>	354
<i>papillosum</i>	317	<i>swartzii</i>	349
<i>parviflorum</i>	317	<i>triflorum</i>	354
<i>pedunculatum</i>	316	<i>Perotis cubana</i>	346
<i>pellitum</i>	301	<i>Phalarideae</i>	264, 269
<i>pilosum</i>	311, 321	<i>Phalaris</i>	364
<i>platicaulon</i>	300, 301	<i>canariensis</i>	364
<i>platyphyllum</i>	299	<i>zizanioides</i>	285
<i>plicatulum</i>	309, 310	<i>Pharus</i>	360
<i>poiretii</i>	313, 317	<i>brasiliensis</i>	361
<i>polystachyum</i>	321	<i>glaber</i>	361
<i>portoricense</i>	314	<i>lancifolius</i>	361
<i>propinquum</i>	315	<i>latifolius</i>	361
<i>psammophilum</i>	316	<i>ovalifolius</i>	361
<i>pubescens</i>	402	<i>parvifolius</i>	361
<i>pubiflorum</i>	308	<i>Phleum</i>	367
<i>pulchellum</i>	321	<i>pratense</i>	367
<i>pulchrum</i>	300	<i>Phragmites</i>	386, 402
<i>pumilum</i>	309	<i>martinicensis</i>	386
<i>pusillum</i>	317	<i>phragmites</i>	386
<i>racemosum</i>	307	<i>Pigeon grass</i>	352
<i>repens</i>	307	<i>Piptatherum confine</i>	290
<i>reptatum</i>	318, 402	<i>setosum</i>	287, 402
<i>rhizomatosum</i>	402	<i>Pitillo</i>	344
<i>richardii</i>	314	<i>Pito de bejuco</i>	337
<i>rigidifolium</i>	315	<i>Pito enano</i>	358
<i>rottboellioides</i>	312	<i>Planotia</i>	400
<i>rupestre</i>	313	<i>virgata</i>	400
<i>saccharoides</i>	321	<i>Platonia virgata</i>	400
<i>schreberianum</i>	320	<i>Poa</i>	395
<i>scrobiculatum</i>	311	<i>acutiflora</i>	391
<i>secans</i>	319	<i>amabilis</i>	388
<i>serpentinum</i>	309	<i>annua</i>	395
<i>serratum</i>	306, 307	<i>berteroniana</i>	391
<i>setaceum</i>	315	<i>cilianensis</i>	390
<i>simpsoni</i>	314	<i>ciliaris</i>	388
<i>sinuosum</i>	402	<i>compressa</i>	395
<i>stoloniferum</i>	307	<i>conferta</i>	390
<i>strictum</i>	402	<i>domingensis</i>	392
<i>swartzianum</i>	312	<i>eragrostis</i>	390
<i>taphrophyllum</i>	309	<i>glomerata</i>	390
<i>underwoodii</i>	320	<i>glutinosa</i>	390

	Page.		Page.
<i>Poa hypnoides</i>	389	<i>Saccharum</i>	273, 386
<i>infirm</i> a	395	<i>antillarum</i>	353
<i>nitida</i>	391	<i>bicorne</i>	283
<i>pilosa</i>	389	<i>caudatum</i>	273
<i>plumosa</i>	388	<i>cayennense</i>	273
<i>prolifera</i>	392	<i>contractum</i>	273
<i>purpurascens</i>	391	<i>jamaicense</i>	274
<i>reptans</i>	389	<i>officinarum</i>	273
<i>rigida</i>	396	<i>polystachyum</i>	292, 321
<i>virgata</i>	393	<i>sagittatum</i>	386
<i>Poatae</i>	264	<i>violaceum</i>	273
<i>Podosaemum virens</i>	290	<i>Sacciolepis</i>	339
<i>Pollinia brevifolia</i>	279	<i>gibba</i>	339
<i>microstachya</i>	280	<i>myuros</i>	340
<i>Polyodon distichum</i>	381	<i>striata</i>	339
<i>Polypogon</i>	370	<i>vilvoides</i>	340
<i>cubensis</i>	363	Saint Augustine grass	356
<i>filiformis</i>	363	Salt grass	394
<i>littoralis</i>	371	San Juan de Castillo	328
<i>monspeliensis</i>	371	Sand bur	354
<i>spicatus</i>	377	<i>Sanguinaria vaginata</i>	307
<i>Pond-grass</i>	362	<i>Saugetia</i>	378
<i>Ptychophyllum</i>	347	<i>fasciculata</i>	378
<i>Rabdochloa cruciata</i>	375	<i>Schizachyrium brevifolium</i>	279
<i>imbricata</i>	383	<i>condensatum</i>	280
<i>mucronata</i>	382	<i>cubense</i>	280
<i>Rabo de gato</i>	351	<i>domingense</i>	281
<i>zorra</i>	283, 292	<i>gracile</i>	280
<i>Raddia</i>	358, 359	<i>hirtiflorus</i>	281
<i>biformis</i>	358	<i>malacostachyum</i>	279
<i>distichophylla</i>	360	<i>multinervosum</i>	280
<i>nana</i>	360	<i>semiberbe</i>	282
<i>polypodioides</i>	360	<i>tenerum</i>	281
<i>urbaniana</i>	359	<i>Schultesia petraea</i>	374
<i>Redtop</i>	371	<i>Scleropoa</i>	396
<i>Reed grass</i>	386	<i>rigida</i>	396
<i>Reimaria brasiliensis</i>	302	Scotch grass	328
<i>conferta</i>	302	<i>Scutachne</i>	341
<i>diffusa</i>	402	<i>amphistemon</i>	341
<i>elegans</i>	321	<i>dura</i>	341
<i>laxa</i>	292	Seaside oats	393
<i>oligostachya</i>	302	<i>Senites</i>	392
<i>Reimarochloa</i>	302	<i>haitiensis</i>	392
<i>brasiliensis</i>	302	<i>zeugites</i>	392
<i>oligostachya</i>	302	<i>Setaria antillarum</i>	354
<i>Rescue grass</i>	396	<i>berteroniana</i>	351
<i>Reynaudia</i>	363	<i>biconveza</i>	350
<i>filiformis</i>	363	<i>brachiata</i>	349
<i>Rhaphis</i>	288	<i>audata</i>	349
<i>pauciflora</i>	288	<i>elongata</i>	348
<i>Rhapis</i>	288	<i>flava</i>	351
<i>Rhytachne rottboellioides</i>	274	<i>geniculata</i>	350
<i>Rice</i>	362	<i>glauca</i>	351
<i>grass</i>	275	<i>var. geniculata</i>	351
<i>Ridging grass</i>	283	<i>var. imberbis</i>	351
<i>Rottboellia aurita</i>	276	<i>var. penicillata</i>	351
<i>exaltata</i>	275	<i>var. purpurascens</i>	351
<i>filifolia</i>	275	<i>hispida</i>	351
<i>impressa</i>	275	<i>italica</i>	352
<i>loricata</i>	275	<i>macrostachya</i>	349
<i>salzmanni</i>	281	<i>magna</i>	352
<i>stolonifera</i>	356, 357	<i>ocreata</i>	402
<i>triflora</i>	276	<i>onurus</i>	349
<i>Rytilix</i>	276	<i>purpurascens</i>	351
<i>glandulosa</i>	276	<i>scandens</i>	352
<i>granularis</i>	276	<i>setosa var. caudata</i>	349
<i>Sacasebo</i>	308	<i>tenacissima</i>	352

	Page.		Page.
<i>Setaria ventenatii</i>	351	<i>Streptogyne</i>	393
<i>verticillata</i>	352	<i>crinita</i>	393
<i>viridis</i>	352	Sudan grass	286
<i>vulpiseta</i>	350	Sugar cane	273
Seymour grass	282	Súrbaná	328
Sorghastrum	286	Sweet vernal grass	364
<i>agrostoides</i>	287	<i>Syllepis polystachya</i>	321
<i>francavillanum</i>	287	Syntherisma	292
<i>parviflorum</i>	287, 402	<i>argillacea</i>	298
<i>setosum</i>	287	<i>argyrostachya</i>	294
<i>stipoides</i>	287	<i>curvinervis</i>	295
Sorgho	286	<i>digitata</i>	293
<i>Sorghum bicorné</i>	283	<i>fimbriata</i>	294
<i>brevifolium</i>	279	<i>insularis</i>	292
<i>cubanicus</i>	402	<i>ischaemum</i>	294
<i>cubense</i>	280	<i>leucocoma</i>	295, 296
<i>dora</i>	286	<i>longiflora</i>	294
<i>fastigiatum</i>	279	<i>panicea</i>	295, 296
<i>gracile</i>	280	<i>sanguinalis</i>	293
<i>halepensis</i>	286	<i>serotina</i>	294
<i>leucostachyum</i>	283	<i>setosa</i>	293
<i>parviflorum</i>	287	<i>simpsoni</i>	294
<i>pauciflorum</i>	288	<i>villosa</i>	295, 402
<i>saccharoides</i>	282	Tenera	325, 326
<i>vulgare</i>	286	Themeda	288
<i>zizaniodes</i>	285	<i>arguens</i>	288
Sour-grass	282, 292, 318	<i>ciliata</i>	288
Spartina	373	<i>quadrivalvis</i>	288
<i>cynosuroides</i>	373	Thrasya	298
<i>juncea</i>	373	<i>hirsuta</i>	297
<i>patens juncea</i>	373	<i>paspaloides</i>	296, 297
Sphenopholis	372	<i>robusta</i>	297
<i>obtusata</i>	372	<i>Thysanachne peruviana</i>	290
Sporobolus	367	Tibisi	335, 357, 397
<i>affinis</i>	368	Timothy	367
<i>angustus</i>	370	<i>Trachynotia juncea</i>	373
<i>argutus</i>	368	Trachypogon	276
<i>atrovirens</i>	369	<i>filifolius</i>	277
<i>bahamensis</i>	369	<i>gouini</i>	277
<i>berteroanus</i>	370	<i>plumosus</i>	277
<i>brasiliensis</i>	368	<i>polymorphus</i> var. <i>filifolius</i>	277
<i>cubensis</i>	370	var. <i>plumosus</i>	277
<i>domingensis</i>	369	<i>Tragus berteronianus</i>	289
<i>indicus</i>	369, 370	<i>Triaena juncea</i>	379
<i>jacquemontii</i>	369, 370	<i>Triathera americana</i>	380
<i>lamarckii</i>	369, 370	<i>juncea</i>	379, 380
<i>littoralis</i>	369	<i>Trichachne insularis</i>	292
<i>muralis</i>	368	<i>Trichochloa berteroniana</i>	290
<i>purpurascens</i>	370	Tricholaena	346
<i>virginicus</i>	369	<i>insularis</i>	292
<i>Stegosia exaltata</i>	275	<i>rosea</i>	346
Stenotaphrum	356	<i>saccharoides</i>	321
<i>americanum</i>	356	<i>Tricuspis simplex</i>	381
<i>dimidiatum</i> var. <i>americanum</i>	357	Tripogon	381
<i>glabrum</i> var. <i>americanum</i>	357	<i>spicatus</i>	381
<i>sarmentosum</i>	356	Tripsaceae	264, 265
<i>secundatum</i>	356	Tripsacum	272
Stipa <i>arguens</i>	288	<i>dactyloides</i>	272
<i>capillaris</i>	367	<i>hermaphroditum</i>	289
Stolonifera	324	<i>monostachyum</i>	272
<i>Strephium pulchellum</i>	360	Triscenia	290
<i>Streptachne cubensis</i>	367	<i>ovina</i>	290
<i>domingensis</i>	281	Trisetum	371
<i>floridana</i>	367	<i>luteum</i>	401
<i>scabra</i>	367	<i>spicatum</i>	371
Streptochaeta	364	<i>toluccense</i>	371
<i>spicata</i>	364	Uniola	393

	Page.		Page.
<i>Uniola maritima</i>	394	<i>Vilfa cruciata</i>	375
<i>paniculata</i>	393	<i>domingensis</i>	369
<i>racemiflora</i>	393, 394	<i>grisebachiana</i>	370
<i>sparta</i>	393	<i>indica</i>	370
<i>spicata</i>	394	<i>intermedia</i>	402
<i>virgata</i>	393	<i>jacquemontii</i>	370
Uva grass	386	<i>purpurascens</i>	370
Valota	291	<i>richardi</i>	368
<i>eggersii</i>	292	<i>virginica</i>	369
<i>insularis</i>	292	Virgata	325
<i>laxa</i>	292	Water-grass	318
Velvet grass	371	West Indian flora, bibliography	261
Vetiver	285	collections	263
<i>Vetiveria arundinacea</i>	285	Wild cane	386
<i>muricata</i>	285	oats	361
<i>zizanioides</i>	285	Wiregrass	312
<i>Vilfa affinis</i>	369	<i>Zeugites americana</i>	392
<i>arguta</i>	368	<i>haitiensis</i>	392
<i>atrovirens</i>	369	<i>jamaicensis</i>	392
<i>berteroana</i>	370	<i>Zoisia rigida</i>	289

